

INTERNATIONAL COURT OF JUSTICE

**CERTAIN ACTIVITIES CARRIED OUT BY NICARAGUA IN THE BORDER AREA
(COSTA RICA v. NICARAGUA)**

**COUNTER-MEMORIAL OF THE REPUBLIC OF NICARAGUA
ON COMPENSATION**

02 June 2017

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CHAPTER 1: INTRODUCTION

1.1 Pursuant to the Order of the Court dated 2 February 2017, which fixed the time limits for the filing of written pleadings in relation to compensation, Nicaragua respectfully submits this Counter-Memorial in response to Costa Rica's Memorial of 3 April 2017. As provided in Article 49(2) of the Rules of Court, Nicaragua's Counter-Memorial answers the factual and legal arguments in the Memorial and, in doing so, identifies points of agreement and disagreement between the Parties.

I. Procedural History

1.2 On 16 December 2015, the Court issued its Judgment on the merits of this case. It ruled that Costa Rica had sovereignty over a disputed area of uninhabited wetland near the mouth of the San Juan River, which it defined as comprising “some 3 square kilometres between the right bank of the disputed *caño*, the right bank of the San Juan River up to its mouth at the Caribbean Sea and the Harbor Head Lagoon.”¹

1.3 In light of its ruling on sovereignty, the Court further decided that Nicaragua had breached its international obligations “by excavating three *caños*

¹ Provisional Measures Order of 8 March 2011, para. 55; Judgment of 16 December 2015, para. 69.

and establishing a military presence” in the disputed territory.² On this basis, the Court found that Nicaragua “has the obligation to compensate Costa Rica for material damages caused by” those acts,³ and ordered that, “failing agreement between the Parties on this matter within 12 months from the date of t[he] Judgment, the question of compensation due to Costa Rica will, at the request of one of the Parties, be settled by the Court.”⁴

1.4 Nicaragua has fully accepted the Court’s Judgment, including its obligation to provide compensation in accordance with the Judgment and the relevant rules of international law.

1.5 By diplomatic note dated 7 June 2016, Costa Rica presented Nicaragua with its claim for compensation, wherein it claimed to have suffered material damages in the amount of \$6,723,476.48.⁵

1.6 Nicaragua was shocked by the size of Costa Rica’s claim, which it considered exorbitant. Nevertheless, acting in good faith, it promptly assembled an inter-agency team to evaluate the various elements of the claim. Nicaragua also retained experts to assist it in performing this evaluation. On the basis of their review, Nicaragua and its experts determined that many elements of Costa

² Judgment of 16 December 2015, para. 229(1)–(3).

³ *Ibid.*, para. 229(5)(a).

⁴ *Ibid.*, para. 229(5)(b).

⁵ Letter from Costa Rica (S. Ugalde) to Nicaragua (C. Argüello Gómez), reference ECRPB-043-16, 7 June 2016, p. 2. Costa Rica Memorial on Compensation (“CRMC”), Vol. II, Annex 35 (at p. 598).

Rica's claim lacked supporting documentation. Accordingly, on 18 November 2016, Nicaragua requested that Costa Rica supply supporting documentation to substantiate its claim.⁶ Costa Rica responded on 14 December 2016 by providing some additional materials.⁷

1.7 On 16 January 2017, before Nicaragua or its experts had an opportunity to fully analyze the materials that Costa Rica had presented the previous month, Costa Rica requested that the Court settle the question of compensation.⁸

II. Overview of the Counter-Memorial

1.8 This Counter-Memorial consists of five Chapters, followed by Nicaragua's Submissions.

1.9 **Chapter 2**, which follows this Introduction, sets out the facts relevant to compensation. It begins by describing the works that were undertaken by Nicaragua in the disputed area, which were confined to clearing a small channel, or *caño*, in 2010, and two even smaller *caños* in 2013, as well as associated felling of trees. As can be seen in satellite imagery taken since the works were completed, each *caño* soon re-filled with sediment, both as a result of

⁶ Letter from Nicaragua (C. Argüello Gómez) to Costa Rica (S. Ugalde), reference HOL-EMB-280, 18 November 2016, p. 2. CRMC, Vol. II, Annex 37 (at p. 608).

⁷ Letter from Costa Rica (S. Ugalde) to Nicaragua (C. Argüello Gómez), reference ECRPB-148-16, 14 December 2016. CRMC, Vol. II, Annex 38.

⁸ See CRMC, para. 1.8.

natural processes and due to the installation of a small dyke in 2015. The surrounding areas also quickly re-vegetated as a result of natural processes. After the *caños* refilled with sediment, and the vegetation restored itself, the only remaining consequence of Nicaragua’s works was the loss of felled trees. The imagery shows a total of a 180 trees felled.

1.10 **Chapter 3** addresses the law applicable to Costa Rica’s compensation claim. It begins by reviewing the scope and nature of compensation owed to Costa Rica in light of the Court’s Judgment, which limits compensation to “material damages” caused by Nicaragua’s wrongful acts in the disputed territory. The Chapter then shows that Costa Rica is entitled to receive compensation for expenses or losses only insofar as it can prove they were (a) actually incurred, (b) bore a direct and certain causal relationship to Nicaragua’s unlawful activities, and (c) are quantified on the basis of evidence rather than guesswork or speculation. Costa Rica bears the burden of proving each of these elements with clear and convincing evidence. The Chapter closes by showing that Costa Rica is not entitled to compensation for losses or expenses that it incurred as a result of its own voluntary acts.

1.11 **Chapters 4 and 5** respond to the specifics of Costa Rica’s compensation claim.

1.12 In particular, **Chapter 4** addresses the claims that are advanced in relation to the alleged environmental impacts of Nicaragua’s works, for which Costa Rica claims \$3,076,416.84 in compensation. Among other things, the Chapter shows that the technical report upon which Costa Rica relies for its environmental valuation, which was authored by Fundación Neotrópica, a Costa Rican non-governmental organization, is permeated with serious flaws that result in a dramatically inflated valuation.

1.13 Those flaws are explained in two expert reports annexed to this Counter-Memorial:

- An Expert Report co-authored by *Professor Cymie Payne* of Rutgers University, who served as legal advisor to the environmental claims panel of the United Nations Compensation Commission (“UNCC”); and *Robert Unsworth* of Industrial Economics, Inc., which served as the principal technical advisor to the UNCC’s environmental claims panel.
- An Expert Report by *Professor G. Mathias Kondolf* of the University of California, Berkeley, who is a fluvial geomorphologist and expert in environmental river management and restoration.

1.14 These Expert Reports demonstrate that the fundamental premise of the Fundación Neotrópica valuation is flawed since it is based upon an approach

that is inappropriate for valuing environmental damage. For that reason, Fundación Neotrópica’s approach is not used by domestic environmental authorities to value environmental damage.

1.15 The Expert Reports further show that Fundación Neotrópica implements its own inapposite approach incorrectly. Among other things, Fundación Neotrópica arbitrarily assigns monetary values to alleged “ecosystem services” that were not actually impaired. It also dramatically over-estimates the commercial value of the trees that were felled by illogically assuming that the same trees could be felled every year for 50 years. Further, Fundación Neotrópica fails to properly account for the area’s recovery. When these and other errors are corrected, the valuation shrinks to less than 3% of Costa Rica’s claimed amount. When the damage is valued using the appropriate technique, the amount is even less.

1.16 **Chapter 5** responds to Costa Rica’s claim for compensation for the alleged “monitoring” that it claims to have carried out. In particular, the Chapter shows that Costa Rica’s principal claim, in excess of \$3 million for wages paid to Costa Rican police, is not compensable because, *inter alia*, those forces were deployed to provide security against any future hypothetical attempts by Nicaragua to occupy Costa Rican territory, including an imagined Nicaraguan “invasion.” They were not deployed to remedy any environmental harm allegedly caused by Nicaragua, or because of Nicaragua’s presence in the disputed area.

Nor, contrary to Costa Rica's attempt to suggest otherwise, were they dispatched because of the Court's Provisional Measures Order of 8 March 2011, which post-dates their deployment. The Chapter further shows that, in any event, their wages are not compensable since Costa Rica simply relocated existing personnel from elsewhere in Costa Rica. Finally, Chapter 5 demonstrates that Costa Rica's various other monitoring-related claims are not compensable and/or are unsupported by evidence.

1.17 The Counter-Memorial concludes with Nicaragua's Submissions, to the effect that Costa Rica is entitled to no more than \$188,504 for material damages caused by Nicaragua's wrongful acts.

CHAPTER 2: NICARAGUA’S WORKS AND THEIR IMPACTS

2.1 In this Chapter, Nicaragua sets out the facts relevant to Costa Rica’s compensation claim. Section I describes the ecology of the disputed area prior to Nicaragua’s works, where much of the land had been converted to pasture for livestock. Section II describes the works that Nicaragua undertook in connection with the *caño* it cleared in 2010, a project that involved the felling of a reported 180 trees. It further shows that by the middle of the following year, the channel had re-filled with sediment; and, due to the dynamic nature of the environment, the surrounding areas quickly revegetated. Finally, Section III describes the two smaller *caños* that were cleared in 2013. One was so inconsequential that the Ramsar Secretariat determined that it required no remediation; the other was remediated by a small dyke constructed in 2015. As with the 2010 *caño*, the areas surrounding the 2013 *caños* rapidly revegetated.

I. The State of the Disputed Area Prior to Nicaragua’s Works

2.2 The evaluation of environmental impacts to the disputed area must begin with a description of its baseline conditions prior to Nicaragua’s works. Since no description of its pre-existing state is presented in Costa Rica’s Memorial or in its accompanying technical reports, it falls to Nicaragua to do so.

2.3 At the time Nicaragua commenced its works in October 2010, the disputed area was uninhabited, but it was hardly pristine. To the contrary, Costa

Rica had previously permitted agricultural activities to be conducted in the area, including the clearing of land (and trees) for the creation of pastures for cattle-raising. Costa Rica admitted this in a report it presented to the Ramsar Secretariat on 28 October 2011.⁹ There, Costa Rica characterized the area as a place that had undergone “an expansion of the agricultural frontier to make way for sparsely-forested pastures,”¹⁰ and observed the presence of “an area of livestock pasture extending to the east to an area of flooded forest.”¹¹

2.4 This description is consistent with Ramsar’s own characterization of the Caribe Noreste Ramar site that encompasses the disputed area, where Ramsar observed that “[l]and use is principally given over to the development of agricultural and livestock rearing activities, tourism and fishing.”¹² According to Costa Rica’s own estimate, 37 percent of the disputed area was *not* forested, with much of the area devoted to cattle-grazing.¹³ The rest consists primarily of a geomorphically dynamic area of flooded forest and swamp, where naturally-

⁹ Ministry of Environment, Energy and Telecommunications of Costa Rica, Technical Report: Evaluation and assessment of the environmental situation in the North-eastern Caribbean Wetland (Humedal Caribe Noreste) pursuant to the Order of the International Court of Justice, 28 October 2011 (“Costa Rica Technical Report to Ramsar Convention Secretariat (2011)”). CRM, Vol. IV, Annex 155.

¹⁰ *Ibid.*, p. 56.

¹¹ *Ibid.*, p. 13.

¹² Ramsar Advisory Mission (RAM) No. 69, Report: North-eastern Caribbean Wetland of International Importance (Humedal Caribe Noreste), Costa Rica, 17 December 2010. CRM, Vol. IV, Annex 147 (at p. 87).

¹³ Costa Rica Technical Report to Ramsar Convention Secretariat (2011), p. 16. CRM, Vol. IV, Annex 155 (at p. 238).

formed *caños* come and go, and sediment is continually being deposited and redistributed.¹⁴

II. The 2010 *Caño*

2.5 In October 2010, Nicaragua undertook to manually clear a small channel (the 2010 *caño*) connecting the San Juan River to Harbor Head Lagoon.¹⁵ For approximately two-thirds of its length, the *caño* traversed unforested land that Costa Rica characterized as “livestock pasture.”¹⁶

2.6 The works involved removing 180 trees¹⁷ of common species in two non-contiguous patches: a 2-hectare bloc located directly adjacent to a large expanse of cattle grazing pasture; and a 0.48-hectare patch adjacent to Harbor Head Lagoon.¹⁸ This impacted a mere 0.003 percent of the Humedal Caribe Noreste Ramsar site in which the disputed area is located.¹⁹

¹⁴ Ramsar Advisory Mission No. 77, Wetland of International Importance, 10–13 August 2014 (“2014 Ramsar Report”), p. 6. Attachment CR-5 to Letter from Costa Rica (S. Ugalde) to the International Court of Justice (P. Couvreur), reference ECRPB-090-14 with attachments, 22 August 2014. CRM, Vol. II, Annex 22 (at p. 362). Report of G. Mathias Kondolf, PhD: Review of Costa Rica’s Claims for Compensation in the Río San Juan Delta (May 2017) (“Kondolf Report (2017)”), pp. 2-3. Nicaragua Counter-Memorial on Compensation (“NCMC”), Vol. I, Annex 2.

¹⁵ See NCM, paras. 5.107, 5.194–5.196.

¹⁶ Costa Rica Technical Report to Ramsar Convention Secretariat (2011), p. 13. CRM, Vol. IV, Annex 155 (at p. 235).

¹⁷ NCM, paras. 2.67, 5.212; *see also* Hearing on Provisional Measures, CR 2011/2, paras. 44 (at pp. 45–46), 54 (at p. 50) (Reichler, and sources cited therein).

¹⁸ Costa Rica Technical Report to Ramsar Convention Secretariat (2011), p. 44. CRM, Vol. IV, Annex 155 (at p. 266). The 180 removed trees reported by Nicaragua is consistent with the 197 trees reported by Costa Rica. *See SINAC*, Appraisal of maximum average age of the trees felled in primary forest areas in the Punta Castilla, Colorado, Pococí and Limón sectors of Costa Rica, as

2.7 The authorization for the project specified that the work could use only hand-held tools, and that the *caño* could not exceed maximum dimensions of 1,560 metres in length and 30 metres in width.²⁰ The actual work, according to Costa Rica's calculations, resulted in a *caño* that was 350 metres shorter than authorized.²¹ Its maximum width never exceeded 15 metres.²²

2.8 Due to the San Juan River's heavy sediment load and the natural depositional tendencies of the area, the *caño* quickly filled with sediment.²³ The width reduced from an average of 10 metres in mid to late November 2010²⁴ to an average of 6 metres by late December 2010.²⁵ The depth also declined to only 1 metre on average by late December 2010.²⁶

a result of the Nicaraguan Army's occupation for the apparent restoration of an existing canal, December 2010. CRM, Vol. IV, Annex 145 (at p. 49).

¹⁹ See The Annotated Ramsar List of Wetlands of International Importance: Costa Rica, 10 January 2000. CRM, Vol. IV, Annex 141 (at p. 18) (indicating that the Humedal Caribe Noreste covers a total area of 75,310 hectares).

²⁰ Ministry of the Environment and Natural Resources (MARENA), Administrative Resolution No. 038-2008-A1, 30 October 2009. NCM, Vol. III, Annex 34 (at pp. 92–93). See also NCM, para. 5.107.

²¹ Costa Rica Technical Report to Ramsar Convention Secretariat (2011), p. 15. CRM, Vol. IV, Annex 155 (at p. 237).

²² See Report of Professor Colin Thorne, October 2011 (“Thorne Report (2011)”), pp. iv, I-36. CRM, Vol. I, Appendix 1 (at pp. 311, 360).

²³ Kondolf Report (2017), pp. 2-3. NCMC, Vol. I, Annex 2.

²⁴ See Thorne Report (2011), p. I-36 (citing UNITAR/UNOSAT (2011a) report). CRM, Vol. I, Appendix 1 (at p. 360); see also MARENA Technical Monitoring Report from Inspection Conducted 24–26 November 2010. NCM, Vol. II, Annex 14 (at p. 291).

²⁵ Hearing on Provisional Measures, CR 2011/2, Doc. No. 17, Second Certification of Lester Antonio Quintero Gómez, 23 December 2010.

²⁶ Ibid.

2.9 Soon thereafter, the *caño* completely closed. Costa Rica's expert, Professor Colin Thorne, noted in his First Report that "the excavated portion of the [2010] *caño* silted up"²⁷ and "clos[ed] due to siltation during mid-summer 2011."²⁸ He further found that the rapid sedimentation "allow[ed] areas disturbed during construction to begin a process of recovery,"²⁹ and that there was immediate "vegetation regrowth."³⁰ By July 2011, eight months after Nicaragua's works, Professor Thorne reported that "the shrubs and understory appear[ed] to be recovering from the disturbance."³¹

2.10 The area's revegetation can be seen by comparing **Figure 2.1**, which is a satellite image taken in November 2010, that is, immediately after Nicaragua's works, with **Figure 2.2**, which is an image of the same area taken in April 2015.³² In both images, the area where trees were felled is outlined in yellow. The revegetation is readily apparent.

²⁷ Written Statement by Professor Colin Thorne, March 2015 ("Thorne Written Statement (2015)"), para. 5.15.

²⁸ Thorne Report (2011), p. I-63. CRM, Vol. I, Appendix 1 (at p. 387). In his testimony before the Court, Professor Thorne confirmed that the *caño* was closed by mid-summer 2011 "due to a drop in water level, sand deposition in the mouth and siltation along the rest of its length. ... The inlet [at the end of the *caño* connected to Harbor Head Lagoon] remained open, and is still open today. [It] is a backwater from the Harbor Head Lagoon, it has not silted, it has not closed. It is still there just as it has been for 230 years." Hearing on Merits, CR 2015/3, p. 32 (Reichler & Thorne). *See also* Kondolf Report (2017), p. 3. NCMC, Vol. I, Annex 2.

²⁹ Thorne Written Statement (2015), para. 5.2.

³⁰ Thorne Report (2011), p. I-59. CRM, Vol. I, Appendix 1 (at p. 383)

³¹ *Ibid.*, p. I-56.

³² *See also* Kondolf Report (2017), p. 3 and Appendix of imagery. NCMC, Vol. I, Annex 2.



Figure 2.1: Satellite image of disputed area in the vicinity of the 2010 *caño* taken on 19 November 2010, shortly after Nicaragua's works, with felled areas outlined in yellow.



Figure 2.2: Satellite image of disputed area in the vicinity of the 2010 *caño* taken on 20 April 2015, with felled areas outlined in yellow.

2.11 **Figure 2.3** shows the same area in January 2017. By that time, the path of the 2010 *caño* had become only barely visible, and the areas where trees had been felled fully revegetated. Significantly, no remediation work on the 2010 *caño* or its environs was required or undertaken by Costa Rica.



Figure 2.3: Satellite image of disputed area in the vicinity of the 2010 *caño* taken on 17 January 2017, with felled areas outlined in yellow. Nearby areas, unaffected by Nicaragua's works, show damage from Hurricane Otto, which made landfall in late November 2016.

III. The 2013 *Caños*

2.12 In September 2013, Nicaragua excavated two small channels closer to the mouth of the San Juan River in an area that the Ramsar Secretariat characterized as “flooded grassland” and “swamp or flooded forests.”³³ Professor

³³ Ramsar Advisory Mission No. 77, Wetland of International Importance, 10–13 August 2014 (“2014 Ramsar Report”), p. 6. Attachment CR-5 to Letter from Costa Rica (S. Ugalde) to the

Thorne testified that these channels were located “much further north and on land which is much younger” than the 2010 *caño*, where the “nature of the ground and the vegetation” is materially different.³⁴ In particular, because this land is “not as old and well established,” the trees are younger than those near the 2010 *caño*.³⁵

2.13 Nicaragua’s works included the digging of a small trench on the sandbar at the end of the eastern *caño*. Before the end of 2013, Nicaragua filled and revegetated the trench pursuant to the Court’s Order of 22 November 2013.³⁶

2.14 Based on a site visit in March 2014, the Ramsar Secretariat determined that the western of the two 2013 *caños* was “not very developed” and that it merited no further attention.³⁷ Costa Rica concedes that it suffered no “quantifiable environmental damage” from this *caño* and does not seek any compensation in relation to it.³⁸

International Court of Justice (P. Couvreur), reference ECRPB-090-14 with attachments, 22 August 2014. CRMC, Vol. II, Annex 22 (at p. 362).

³⁴ Hearing on Merits, CR 2015/3, p. 42 (Thorne).

³⁵ *Ibid.*

³⁶ See Provisional Measures Order of 22 November 2013, paras. 40, 59(2)(B); CRMC, para. 3.33(f) (“the trench dug across [the sandbar] had been filled, as had been required by the Court in its 2013 Order on Provisional Measures.”); Thorne Written Statement (2015), para. 6.9 (“In November 2013, the Court instructed that the trench across the beach between the eastern *caño* and the Caribbean Sea should be back filled and revegetated. This was done and it reduced the risk of diversion of the River.”). Costa Rica does not claim any compensation is owed for the trench.

³⁷ 2014 Ramsar Report, p. 2. CRMC, Vol. II, Annex 22 (at p. 358).

³⁸ See CRMC, para. 2.2(a) (indicating that the “material damage suffered by Costa Rica as a direct consequence” of Nicaragua’s activities include only “quantifiable environmental damage caused by Nicaragua’s excavation of the first *caño* in 2010-2011, and a further *caño* in 2013,” not two *caños* in 2013) (emphasis added).

2.15 The eastern 2013 *caño* was located at “the narrowest stretch of the land between the right bank of the river and the beach at the coast.”³⁹ Costa Rica acknowledges that it impacted no more than 0.43 hectares,⁴⁰ and that the channel was successfully remediated by constructing a small dyke in March 2015.⁴¹ In fact, by the time work on the dyke began, the *caño* had already largely closed through natural processes.⁴² As a result, the remediation project “required fewer materials than those planned in the original design.”⁴³

2.16 In July 2015, Costa Rican personnel monitoring the dyke “confirmed that the regeneration process ha[d] advanced in comparison to the previous overflight,” which had been performed the prior month.⁴⁴ Three months later, in October 2015, Costa Rica found that “[d]ue to the growing process of natural regeneration of the site of construction of the dyke, it is no longer possible

³⁹ Report by the Costa Rican Ministry of Environment and Energy (MINAE), 12 August 2014, p. 1. Attachment CR-4 to Letter from Costa Rica (S. Ugalde) to the International Court of Justice (P. Couvreur), reference ECRPB-090-14 with attachments, 22 August 2014. CRMC, Vol. II, Annex 22 (at p. 323).

⁴⁰ CRMC, para. 3.11.

⁴¹ *Ibid.*, paras. 3.41–3.42; MINAE, Report of works carried out from 26 March to 10 April 2015 within the framework of the implementation of the VI Investment Plan pursuant to Decree No. 36440-MP, 16 April 2015 (“2015 MINAE Report”), p. 26. CRMC, Vol. I, Annex 4 (at p. 228).

⁴² See 2015 MINAE Report, p. 14 (“we observed that the sedimentation process had favoured the decrease in the depth of the [*caño*]....”). CRMC, Vol. I, Annex 4 (at p. 216). See also *ibid.*, p. 15 (reporting “visible sedimentation” along the banks of the *caño*).

⁴³ *Ibid.*, p. 26. See also Kondolf Report (2017), p. 3. NCMC, Vol. I, Annex 2.

⁴⁴ Monitoring Report, 8 July 2015, p. 151. Attachment to Costa Rica’s National Commission for Risk Prevention and Emergencies Attention (CNE), Department of Reconstruction Process, Reports of expenses, 4 April 2016 (“CNE, Reports of Expenses (2016)”). CRMC, Vol. II, Annex 15 (at p. 168).

to see the dyke structure directly.”⁴⁵ Costa Rica’s inspection confirmed there were “no visible indications of intentional damage or erosion to the structure of the dyke, which suggests that the dyke remains whole and that it promotes the natural regeneration process.”⁴⁶

2.17 Commensurate with the minor nature of the works carried out in 2013, Professor Thorne testified that their impacts could *not* be characterized as “significant,”⁴⁷ and observed that “[v]egetation does recovery very quickly in these areas.”⁴⁸ The Ramsar Secretariat likewise noted that the area in the vicinity of the *caño* has a “high capability for natural regeneration of vegetation.”⁴⁹

2.18 The closure of the 2013 *caño* and associated revegetation can be seen in **Figures 2.4–2.7**, which are satellite images taken in April 2015 (immediately after the construction of the dyke), December 2015, January 2017, and March 2017. As is readily apparent, by March 2017, the *caño* is no longer evident, and revegetation has made the previously impacted area virtually indistinguishable from other areas nearby.⁵⁰

⁴⁵ Monitoring Report, 3 October 2015, p. 155. Attachment to CNE, Reports of Expenses (2016). CRMC, Vol. II, Annex 15 (at p. 172).

⁴⁶ *Ibid.*

⁴⁷ Hearing on Merits, CR 2015/3, p. 42 (Robinson & Thorne).

⁴⁸ *Ibid.*, p. 42 (Thorne).

⁴⁹ 2014 Ramsar Report, p. 14. CRMC, Vol. II, Annex 22 (at p. 370).

⁵⁰ See Kondolf Report (2017), p. 3. NCMC, Vol. I, Annex 2.



Figure 2.4: Satellite image of disputed area in the vicinity of the 2013 *caño* taken on 20 April 2015, shortly after Costa Rica completed installation of the dyke on 6 April 2015.



Figure 2.5: Satellite image of disputed area in the vicinity of the 2013 *caño* taken on 15 December 2015.



Figure 2.6: Satellite image of disputed area in the vicinity of the 2013 *caño* taken on 17 January 2017.



Figure 2.7: Satellite image of disputed area in the vicinity of the 2013 *caño* taken on 10 March 2017.

2.19 In sum, Nicaragua's works in the disputed area caused only minor disturbances that were quickly remediated, both through natural processes and by the installation of the dyke in 2015. The only material damage caused by Nicaragua's activities was the felling of trees in the vicinity of the 2010 *caño*.

CHAPTER 3: PRINCIPLES OF DAMAGES

3.1 In this Chapter, Nicaragua sets out the principles of international law relevant to Costa Rica’s claim for compensation. It begins with the terms of the Court’s Judgment of 16 December 2015, which limits reparations to “material damages” caused by the activities in the disputed area that the Court determined were wrongful. The Chapter then describes the elements necessary for Costa Rica to establish an entitlement to compensation and the amount thereof.

I. The Court’s Judgment of 16 December 2015

3.2 The starting point for the determination of compensation is the Court’s Judgment of 16 December 2015, which held that “Nicaragua has the obligation to compensate Costa Rica for material damages caused by Nicaragua’s unlawful activities on Costa Rican territory.”⁵¹

3.3 The terms of the Judgment thus entitle Costa Rica to compensation only for “material damages.” No other forms of compensation, including moral, punitive or exemplary damages, are permitted.⁵² Under the applicable rules of State responsibility, the scope of material damages is limited to “damage to

⁵¹ Judgment of 16 December 2015, para. 229(5)(a).

⁵² See Draft Articles on Responsibility of States for Internationally Wrongful Acts, with commentaries, *Yearbook of the International Law Commission*, Vol. II, Part 2 (2001) (“ARSIWA”), Art. 36, cmt. 1 (“The qualification ‘financially assessable’ is intended to exclude compensation for what is sometimes referred to as ‘moral damage’ to a State, i.e. the affront or injury caused by a violation of rights not associated with actual damage to property or persons...”).

property or other interests of the State . . . which is assessable in financial terms.”⁵³

3.4 The Judgment further limits the *ratione materiae* and *ratione loci* of compensation to losses or expenses caused by the activities in the disputed area that the Court determined were unlawful. No compensation is owed for any other activities.

3.5 The limitations set out in the Court’s Judgment reflect the principle that the purpose of compensation is to “address the actual losses incurred as a result of the internationally wrongful act. . . . It is not concerned to punish the responsible State, nor does compensation have an expressive or exemplary character.”⁵⁴ This principle was recognized long ago by the United States-Germany Claims Commission in the *Lusitania* cases, which concluded that “no exemplary, punitive, or vindictive damages can be assessed.”⁵⁵ As the Eritrea-Ethiopia Claims Commission observed, “compensation has a limited . . . role” which is “remedial, not punitive.”⁵⁶

3.6 It follows from this principle that compensation must be proportionate to the actual injury suffered. It should not create a windfall for the

⁵³ *Ibid.*, Art. 31, cmt. 5.

⁵⁴ *Ibid.*, Art. 36, cmt. 4.

⁵⁵ *Opinion in the Lusitania Cases*, Mixed Claims Commission (United States and Germany), 1 November 1923 – 30 October 1929, reprinted in 5 UNRIAA 1 (2006), p. 36.

⁵⁶ *State of Eritrea and Federal Democratic Republic of Ethiopia*, Eritrea-Ethiopia Claims Commission, Final Award, Eritrea’s Damages Claims, 17 August 2009, para. 26.

receiving State, because its aim is only to “offset, as far as may be, the damage suffered by the injured State as a result of the breach.”⁵⁷ As explained in *Lusitania*, “[t]he remedy should be commensurate with the loss.”⁵⁸

II. Compensation May Be Awarded Only When It Is Proven That a Specific Injury Has a Direct and Certain Causal Relationship to an Internationally Wrongful Act

3.7 The Court in the *Ahmadou Sadio Diallo* case, taking “into account the practice in other international courts, tribunals and commissions,” explained that determining whether compensation is required, and if so, in what amount, involves a three-step process. In particular:

As to each head of damage, the Court will consider whether an injury is established. It will then ‘ascertain whether, and to what extent, the injury asserted by the Applicant is the consequence of wrongful conduct by the Respondent’, taking into account ‘whether there is a sufficiently direct and certain causal nexus between the wrongful act . . . and the injury suffered by the Applicant.’ ... If the existence of injury and causation is established, the Court will then determine the valuation.⁵⁹

Each of these steps, including how they have been applied to claims for environmental harm, is addressed below.

⁵⁷ ARSIWA, Art. 36, cmt. 4.

⁵⁸ *Opinion in the Lusitania Cases*, p. 39.

⁵⁹ *Ahmadou Sadio Diallo (Republic of Guinea v. Democratic Republic of the Congo), Compensation, Judgment, I.C.J. Reports 2012*, p. 324, paras. 13–14 (quoting *Application of the Convention on the Prevention and Punishment of the Crime of Genocide (Bosnia and Herzegovina v. Serbia and Montenegro), Judgment, I.C.J. Reports 2007*, p. 43, para. 462 (alteration in original)).

3.8 First, because a State is only obligated to provide compensation for “the injury caused by [an] internationally wrongful act,”⁶⁰ compensation may not be awarded in the absence of an injury.⁶¹ The existence of an injury cannot merely be asserted by the claimant or assumed by the Court; it must be proven with competent evidence. For that reason, in *Diallo*, the Court rejected claims for compensation on the basis that Guinea had not presented sufficient evidence that the alleged loss had in fact been incurred.⁶²

3.9 The United Nations Compensation Commission applied this rule to claims of alleged environmental harm arising out of Iraq’s invasion and occupation of Kuwait. Kuwait asserted that the release of approximately eleven million barrels of oil into its territorial waters had damaged the habitats of its

⁶⁰ ARSIWA, Art. 31(1).

⁶¹ *Diallo*, para. 14 (“As to each head of damage, the Court will consider whether an injury is established.”); *Armed Activities on the Territory of the Congo (Democratic Republic of the Congo v. Uganda), Judgment, I.C.J. Reports 2005*, p. 168, para. 260 (holding that the DRC, in order to establish entitlement to reparation, would need to “demonstrate and prove the exact injury that was suffered as a result of specific actions of Uganda constituting internationally wrongful acts for which it is responsible”).

⁶² See *Diallo*, para. 31 (rejecting a claim for compensation for lost personal effects because Guinea “failed to prove the extent of the loss of Mr. Diallo’s personal property”); *ibid.*, para. 34 (rejecting claims for compensation for the alleged loss of high-value items in Mr. Diallo’s apartment because “Guinea has put forward no evidence whatsoever that Mr. Diallo owned these items at the time of his expulsion, that they were in his apartment if he did own them, or that they were lost as a result of his treatment by the DRC”); *ibid.*, para. 35 (rejecting a claim for compensation for the alleged loss of assets contained in bank accounts because “[t]here is no information about the total sum held in bank accounts, the amount of any particular account or the name(s) of the bank(s) in which the account(s) were held”); *ibid.*, paras. 41–42 (rejecting a claim for compensation for the alleged loss of professional remuneration in the amount of US\$25,000 per month because “Guinea offers no evidence to support the claim” and “there is evidence suggesting that Mr. Diallo was not receiving US\$25,000 per month in remuneration from the two companies prior to his detentions”); see also *Ahmadou Sadio Diallo (Republic of Guinea v. Democratic Republic of the Congo), Declaration to the Judgement of the Court of Judge Greenwood*, p. 391, paras 3–4.

aquatic flora and fauna, and sought compensation for the alleged loss.⁶³ The Commission rejected Kuwait's claim because it had not provided sufficient evidence to prove actual injury to the aquatic biota.⁶⁴ The Commission likewise denied compensation claims for lack of demonstrated injury when claimants failed to prove that the environment had been negatively impacted even where it was "reasonable to assume that some damage could have been caused."⁶⁵

3.10 Second, even if an injury has been proven, compensation may not be awarded unless it is also demonstrated that there is a "causal nexus between the wrongful act . . . and the injury suffered by the Applicant."⁶⁶ The required causal nexus is absent when an injury would have been incurred in the absence of internationally wrongful conduct. That is why, in the *Case Concerning the*

⁶³ United Nations Compensation Commission, Report and Recommendations made by the Panel of Commissioners concerning the Fifth Instalment of "F4" Claims, U.N. Doc. S/AC.26/2005/10 ("UNCC, Report and Recommendations on the Fifth Instalment of "F4" Claims"), 30 June 2005, paras. 430, 433.

⁶⁴ *Ibid.*, para. 440.

⁶⁵ United Nations Compensation Commission, Report and Recommendations Made by the Panel of Commissioners Concerning Part One of the Fourth Instalment of "F4" Claims, U.N. Doc. S/AC.26/2004/16, 9 December 2004, paras. 153–154 ("The Panel considers that, although it is reasonable to assume that some damage could have been caused to the coral reefs by the presence of refugees, Jordan has provided no evidence to establish that any damage attributable to Iraq's invasion and occupation of Kuwait was caused to the coral reefs or that any such damage still persists that would require remediation. . . . Accordingly, the Panel recommends no compensation..."); *see also*, e.g., *ibid.*, para. 87 (finding insufficient evidence that contamination from oil well fires had caused long-term damage to vegetation or soil); *ibid.*, para. 93 (finding insufficient evidence that contaminants from oil well fires had caused damage to groundwater); *ibid.*, para. 296 (rejecting a claim for compensation for remediation expenses where "although soot deposition may have caused damage to plants at the time of the oil well fires, Saudi Arabia has not demonstrated the presence of any residual, ongoing damage to soils that would require remediation"); *ibid.*, para. 340 (finding insufficient evidence that contamination from oil well fires had harmed surface water resources in Syria to support an award of compensation).

⁶⁶ *Diallo*, para. 14.

Application of the Genocide Convention,⁶⁷ the Court, after concluding that Serbia and Montenegro had breached its obligation to prevent genocide, evaluated whether a causal nexus existed between that breach and the damages caused by the acts of genocide.⁶⁸ The Court held that “[s]uch a nexus could be considered established only if the Court were able to conclude from the case as a whole and with a sufficient degree of certainty that the genocide at Srebrenica would in fact have been averted if the Respondent had acted in compliance with its legal obligations.”⁶⁹ Because the evidence did not support such a conclusion, the Court held that compensation was not warranted.⁷⁰

3.11 Proving a causal nexus between the wrongful act and the alleged injury is not, by itself, sufficient to establish a claim for compensation.⁷¹ That is because compensation is not owed for “any and all consequences flowing from an internationally wrongful act.”⁷² Rather, as the Court has repeatedly stressed, the causal nexus between the wrongful act and injury must be “*direct and certain*.”⁷³ Other international courts and tribunals have used terms such as “proximate

⁶⁷ *Application of the Convention on the Prevention and Punishment of the Crime of Genocide*, p. 43.

⁶⁸ *Ibid.*, paras. 450, 459.

⁶⁹ *Ibid.*, paras. 462.

⁷⁰ *Ibid.*

⁷¹ ARSIWA, Art. 31, cmt. 10 (“causality in fact is a necessary but not a sufficient condition” for compensation).

⁷² *Ibid.*, Art. 31, cmt. 9.

⁷³ *Diallo*, para. 14 (emphasis added); *Application of the Convention on the Prevention and Punishment of the Crime of Genocide*, para. 462.

cause” or “foreseeability.”⁷⁴ Whatever term is used, the import is the same: losses, damages or injuries that are “too indirect, remote, and uncertain” are not subject to compensation.⁷⁵

3.12 The application of these principles is illustrated by the UNCC’s rejection of a claim by Jordan regarding expenditures on infrastructure projects.⁷⁶ Jordan argued it was “obliged to undertake” the projects to prevent damage to water supplies in four basins due to an influx of refugees.⁷⁷ There was no question that Jordan had undertaken the projects and increased water sector investments. The Panel, however, declined to award compensation because the data made it “difficult to determine what part, if any, of the increase in investments is attributable to the presence of the refugees” and moreover showed that the projects were not implemented solely in the four basins that Jordan asserted were altered by refugees, but were carried out in “all regions of Jordan.”⁷⁸

⁷⁴ See, e.g., Eritrea-Ethiopia Claims Commission, Decision Number 7: Guidance Regarding *Jus ad Bellum* Liability, 27 July 2007, paras. 7, 13–14; ARSIWA, Art. 31, cmt. 10.

⁷⁵ *Trail Smelter Arbitration* (United States, Canada), Award, 16 April 1938 and 11 March 1941, reprinted in 3 UNRIAA 1905 (2006), p. 1931; see also Protocol V (Record of the proceedings of the tribunal of arbitration at the fifth conference held at Geneva, in Switzerland, on the 19th of June, 1872), in “Report of J. C. Bancroft Davis, Agent of the United States, *Alabama Arbitration*”, 21 September 1892, reprinted in REPORT OF THE AGENT OF THE UNITED STATES BEFORE THE TRIBUNAL OF ARBITRATION AT GENEVA (1873), pp. 21–22.

⁷⁶ UNCC, Report and Recommendations on the Fifth Instalment of “F4” Claims, 30 June 2005, paras. 330–336.

⁷⁷ *Ibid.*, para. 330

⁷⁸ *Ibid.*, paras. 333–334.

3.13 Third, assuming that the State seeking compensation establishes both injury and a direct and certain causal relationship with the wrongful act, it must also prove the quantum, *i.e.*, the monetary value, of the loss.⁷⁹ This flows from the fact that compensation is meant to remedy the “actual losses” of the injured State—no more and no less.⁸⁰

3.14 That is why in *Diallo* the Court rejected a claim for lost income; not only was there insufficient evidence of Mr. Diallo having received income from certain companies before his detention, but Guinea had failed to present evidence, such as bank account or tax records, that would allow the Court to determine the amount of any such income.⁸¹ For the same reason, the UNCC rejected claims for compensation when the claimant failed to “demonstrate the ... amount of the claimed expenditures....”⁸²

⁷⁹ *Diallo*, para. 14 (“If the existence of injury and causation is established, the Court will then determine the valuation”).

⁸⁰ ARSIWA, Art. 36, cmt. 4. As stated by the PCIJ in *Factory at Chorzów*, “reparation must, as far as possible, wipe out all the consequences of the illegal act and reestablish the situation which would, in all probability, have existed if that act had not been committed.” *Factory at Chorzów (Claim for Indemnity) (Merits)*, Judgment No. 13, 1928, P.C.I.J., Series A. No. 9, p. 21, p. 47. The full reparation standard sets both a floor and a ceiling on compensation.

⁸¹ *Diallo*, para. 44 (“The Court therefore concludes that Guinea has failed to establish that Mr. Diallo was receiving remuneration from Africom-Zaire and Africontainers-Zaire on a monthly basis in the period immediately prior to his detentions in 1995-1996 or that such remuneration was at the rate of US\$25,000 per month.”); *see also Factory at Chorzów*, p. 56 (rejecting a claim for compensation because the Court did not have before it sufficient data to determine not only the existence but also the extent of damage); Eritrea-Ethiopia Claims Commission, Final Award, Eritrea’s Damages Claims, 17 August 2009, para. 1 (“compensation can only be awarded where there is evidence sufficient in the circumstances to establish the extent of damage...”).

⁸² United Nations Compensation Commission, Report and Recommendations made by the Panel of Commissioners concerning the First Instalment of “F4” Claims, U.N. Doc. S/AC.26/2001/16

3.15 This principle applies equally to compensation for harm to natural resources, including those not traded in a market. It was recognized as early as the *Trail Smelter Arbitration* and as recently as the UNCC that a monetary value cannot be assigned to such harm on the basis of “mere speculation or guess.”⁸³ Moreover, any inferences made as part of the valuation must be “just and reasonable.”⁸⁴ The F4 Panel of the UNCC considered that particular caution is warranted before assigning a monetary value to goods and services that are not traded in the market, concluding that it would only accept such valuations once it had “satisfied itself that the extent of damage and the quantification of compensation claimed are appropriate and reasonable in the circumstances of each claim.”⁸⁵

III. Costa Rica Must Prove Each of the Elements Required for Compensation with Clear and Convincing Evidence

3.16 At each of the three stages described above – injury, causation, and valuation – the party seeking compensation bears the burden of proving each of

(“UNCC, Report and Recommendations on the First Instalment of “F4” Claims”), 22 June 2001, para. 189; *see also, e.g.*, *ibid.*, paras. 232, 382, 408 (same).

⁸³ *Ibid.*, para. 80 (quoting *Trail Smelter Arbitration*, p. 1920).

⁸⁴ *Ibid.* (quoting *Trail Smelter Arbitration*, p. 1920).

⁸⁵ UNCC, Report and Recommendations on the Fifth Instalment of “F4” Claims, 30 June 2005, para. 81.

these elements with clear and convincing evidence. This is because compensation is only due for “financially assessable damage … *insofar as it is established.*”⁸⁶

3.17 The burden of proving entitlement to compensation rests with the party seeking such compensation. As the Court has held, “it is for the party which alleges a particular fact in support of its claims to prove the existence of that fact.”⁸⁷ This general rule applies with equal force to claims for compensation, as illustrated by the *Armed Activities* case, where the Court held that it was for the Democratic Republic of Congo to “demonstrate and prove the exact injury that was suffered as a result” of Uganda’s internationally wrongful acts.⁸⁸ The same approach is followed by other international courts and tribunals, including the UNCC and the Eritrea-Ethiopia Claims Commission.⁸⁹

3.18 To discharge its burden of proof, the party seeking compensation must present clear, credible and convincing evidence in support of its claims.⁹⁰

⁸⁶ ARSIWA, Art. 36(2) (emphasis added).

⁸⁷ *Diallo*, para. 15; see also *Application of the Interim Accord of 13 September 1995 (the former Yugoslav Republic of Macedonia v. Greece)*, Judgment, I.C.J. Reports 2011, p. 644, para. 72; *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, Judgment, I.C.J. Reports 2010, p. 14, para. 162.

⁸⁸ *Armed Activities on the Territory of the Congo*, para. 260.

⁸⁹ See United Nations Compensation Commission, Provisional Rules for Claims Procedure, U.N. Doc. S/AC.26/1992/10, 26 June 1992, Art. 35(1) (“Each claimant is responsible for submitting documents and other evidence which demonstrate satisfactorily that a particular claim or group of claims is eligible for compensation pursuant to Security Council resolution 687 (1991.”); Eritrea-Ethiopia Claims Commission, Final Award, Eritrea’s Damages Claims, 17 August 2009, para. 87 (holding that the Commission could award compensation to Eritrea “only where Eritrea submitted reasonable and credible proof...”).

⁹⁰ For general discussion of the Court’s evidentiary practice, see Jean-Flavien Lalive, “Quelques remarques sur la preuve devant la Cour permanente et la Cour internationale de Justice”,

With respect to a claim for expenses allegedly incurred, this requires that the claim be substantiated by documentation—such as receipts, invoices, or other primary documents—showing that payment was made and in what amount.⁹¹

Thus, in *Diallo*, an inventory of personal belongings that Mr. Diallo allegedly lost when he was expelled was held to be insufficient evidence to support the claimed quantum of compensation.⁹²

3.19 Other international tribunals have rejected compensation claims for similar reasons. For example, the UNCC rejected:

- a claim for the costs of a completed study to assess environmental impact, which was substantiated only by a “report and a one-page budget”;⁹³

⁷ *Annuaire suisse de droit international* 77 (1950); Keith Highet, “Evidence, the Court, and the Nicaragua Case”, 81 *American Journal of International Law* 1 (1987); Eduardo Valencia-Ospina, “Evidence before the International Court of Justice”, 1 *International Law Forum* 202 (1999); Maurice Kamto, “Les moyens de preuve devant la Cour internationale de Justice à la lumière de quelques affaires récentes portées devant elle”, 49 *German Yearbook of International Law* 259 (2006); Ruth Teitelbaum, “Recent Fact-finding Developments at the International Court of Justice”, 6 *Law and Practice of International Courts and Tribunals* 119 (2007); H.E. Peter Tomka & Vincent-Joël Proulx, “The Evidentiary Practice of the World Court” in LIBER AMICORUM GUDMUNDUR EIRIKSSON (Juan Carlos Sainz-Borgo (ed.), forthcoming 2016). For the evidentiary practice of other international courts and tribunals, see, generally, J.C. Witenberg, “La théorie des preuves devant les juridictions internationales”, 56 *Recueil des Cours* 1, Vol. II (1936), Annex 19; Durward Sandifer, EVIDENCE BEFORE INTERNATIONAL TRIBUNALS (1975); Chitharanjan Amerasinghe, EVIDENCE IN INTERNATIONAL LITIGATION (2005).

⁹¹ See UNCC, Report and Recommendations on the First Instalment of “F4” Claims, 22 June 2001, para. 52 (“For claims concerning monitoring and assessment activities already completed, no compensation has been recommended if the evidence presented to the Panel was not sufficient to demonstrate that the amount claimed were in fact expended.”).

⁹² *Diallo*, paras. 27, 31–33.

⁹³ UNCC, Report and Recommendations on the First Instalment of “F4” Claims, 22 June 2001, paras. 187–190.

- a claim for the costs of a project to investigate pollution from oil fires, for which the claimant failed to present “appropriate evidence, such as contracts, invoices, receipts, salary vouchers and/or accounting records”;⁹⁴
- claims for the costs of completed monitoring studies, where the claimant “provided only summary information on the costs of [the] studies” and “[n]o invoices or receipts”;⁹⁵ and
- a claim for the costs of a monitoring study that was substantiated only by “a one-and-a-half-page document explaining in general terms the basis for the expenses claimed.”⁹⁶

3.20 The Eritrea-Ethiopia Claims Commission likewise rejected as inadequate evidence “inventory lists” of looted items that were not accompanied by the underlying documentary support.⁹⁷ It also found to be insufficient a “skeletal property list with a dollar amount of estimated losses,”⁹⁸ and the

⁹⁴ *Ibid.*, paras. 243–247.

⁹⁵ *Ibid.*, paras. 381, 407.

⁹⁶ *Ibid.*, para. 716; *see also ibid.*, paras. 232, 724, 727–728 (rejecting claims for lack of sufficient evidentiary support).

⁹⁷ Eritrea-Ethiopia Claims Commission, Final Award, Eritrea’s Damages Claims, 17 August 2009, para. 108.

⁹⁸ *Ibid.*, para. 161.

“witness statement of [a] hotel owner, who offered neither detail nor supporting documents.”⁹⁹

3.21 With respect to claims for compensation for alleged environmental harm, carrying the burden of proof requires more than identifying an impact and assigning it monetary value. As noted above, the inferences supporting the valuation must be “just and reasonable.”¹⁰⁰ This requires, at a minimum, showing that the assumptions on which the valuation is based are appropriate and accurate.¹⁰¹ On this basis, the F4 Panel of the UNCC rejected valuations based on “assumptions regarding … lost services and expected recovery periods [that] are either inappropriate or unreasonable.”¹⁰²

IV. Compensation Is Not Permitted for Damages the Injured State Could Have Avoided or to Which It Contributed

3.22 International law recognizes additional limitations on compensation, including that a State’s failure to mitigate will preclude recovery to

⁹⁹ *Ibid.*, para. 174.

¹⁰⁰ UNCC, Report and Recommendations on the Fifth Instalment of “F4” Claims, 30 June 2005, para. 80 (quoting *Trail Smelter Arbitration*, p. 1920).

¹⁰¹ See *Ibid.*, paras. 177–179 (significantly reducing the amount of compensation awarded to Iran because Iran’s valuation was based on unsupported or erroneous assumptions regarding the size of the area affected, the baseline condition of the area prior to Iraq’s occupation and invasion, and the causes of any impact); *ibid.*, para. 439 (rejecting Kuwait’s claim that relied on computer models of biomass loss due to oil contamination because of “substantial and unquantifiable uncertainties” in the models).

¹⁰² See *Ibid.*, para. 424; see also *ibid.*, para 606 (rejecting compensation based on a habitat equivalency analysis put forward by Saudi Arabia where “some of Saudi Arabia’s assumptions and inputs regarding intensity of damage and recovery periods are inappropriate.”).

the extent of such failure.¹⁰³ As the Court explained in the *Gabcikovo-Nagymaros* case:

It is a general principle of international law that a party injured by the non-performance of another contract party must seek to mitigate the damage he has sustained. It would follow from such a principle that an injured State which has failed to take the necessary measures to limit the damage sustained would not be entitled to claim compensation for that damage which could have been avoided.¹⁰⁴

3.23 Similarly, a State should not be awarded compensation for losses or injury insofar as it contributed to them through willful or negligent acts or omissions.¹⁰⁵ Thus, in the *LaGrand* case, the Court observed that Germany's delay in asserting the existence of a breach and in instituting proceedings could have been taken into account had Germany sought indemnification.¹⁰⁶

3.24 These limitations reflect the overarching principle that “[e]ven the wholly innocent victim of wrongful conduct is expected to act reasonably when confronted by the injury.”¹⁰⁷ Accordingly, when a State, in responding to an

¹⁰³ See ARSIWA, Art. 31, cmt. 11.

¹⁰⁴ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, Judgment, I.C.J. Reports 1997, p. 7, para. 80.

¹⁰⁵ ARSIWA, Art. 39.

¹⁰⁶ *LaGrand (Germany v. United States of America)*, Judgment, I.C.J. Reports 2001, p. 466, paras. 57, 116.

¹⁰⁷ ARSIWA, Art. 31, cmt. 11. In the *S.S. Wimbleton* case, the PCIJ's award of compensation based on the delay experienced by the *Wimbleton* after Germany refused its passage through the Kiel Canal was paired with a finding that the vessel “was justified in awaiting for a reasonable time ... before continuing its voyage” by another route. *Case of the S.S. “Wimbleton”*, Judgment, 1923, P.C.I.J., Series A. No. 1, p. 31 (emphasis added).

internationally wrongful act, elects to take steps that are not reasonably necessary or proportionate with respect to the injury, the causal nexus is broken, and compensation should not be awarded for the expenses or losses thereby incurred.¹⁰⁸

3.25 In the two Chapters that follow, Nicaragua applies the principles described above to Costa Rica's claim to compensation for environmental impacts and monitoring, respectively, and demonstrates that Costa Rica has failed to meet its burden of proof in regard to well over 90% of its compensation claim.

¹⁰⁸ The ILC has noted the conceptual relationship between the doctrines of contribution and mitigation, and the requirement of a sufficiently close causal nexus, stating with respect to contribution: "It is possible to envisage situations where the injury in question is entirely attributable to the conduct of the victim and not at all to that of the 'responsible' State. Such situations are covered by the general requirement of proximate cause referred to in article 31...." ARSIWA, Art. 39, note 627 (at p. 110). Insofar as the doctrines of contribution and mitigation require a State to act reasonably in the face of an injury, the requirement of proximate cause (analogous to the Court's requirement of a direct and certain causal nexus) cuts off compensation for losses and expenses not reasonably foreseeable to the responsible State. See Decision Number 7: Guidance Regarding *Jus ad Bellum* Liability, 27 July 2007, para. 13 ("[T]he Commission concludes that the necessary connection is best characterized through the commonly used nomenclature of 'proximate cause.' In assessing whether this test is met, and whether the chain of causation is sufficiently close in a particular situation, the Commission will give weight to whether particular damage reasonably should have been foreseeable to an actor committing the international delict in question.").

CHAPTER 4: COSTA RICA’S CLAIMS FOR COMPENSATION FOR ALLEGED ENVIRONMENTAL IMPACTS

4.1 In this Chapter, Nicaragua responds to Costa Rica’s claims for compensation in regard to the environmental impacts that are alleged to have been caused by the works undertaken by Nicaragua in the disputed area, namely the clearance of the 2010 and 2013 *caños*, and associated felling of trees and removal of underbrush.¹⁰⁹

4.2 The compensation that Costa Rica seeks for these alleged impacts falls into three categories:

- The value of the “social cost,” *i.e.*, the “loss of ecosystem goods and services,” that was allegedly caused by Nicaragua’s activities, which Costa Rica values at \$2,823,111.74;¹¹⁰
- The cost of “restoration measures,” principally “soil restoration costs,” which Costa Rica values at \$57,634.08;¹¹¹ and

¹⁰⁹ Costa Rica accepts that there are no compensable impacts caused by the western 2013 *caño*, only the eastern one.

¹¹⁰ Fundación Neotrópica, Monetary Valuation of the environmental damages arising from the construction of *caños* and clearing of trees and vegetation performed by the Government of Nicaragua in the Costa Rican territory on Isla Portillos, as required by the Judgment of the International Court of Justice of 16 December 2015 (“Fundación Neotrópica, Monetary Valuation Report”), 3 June 2016, pp. 61, 63. CRMC, Vol. I, Annex 1 (at pp. 147, 149).

¹¹¹ *Ibid.*

- The expenses Costa Rica allegedly incurred in constructing the dyke across the eastern 2013 *caño*, for which Costa Rica seeks \$195,671.02.¹¹²

4.3 The first two categories of alleged environmental damage are based on a technical report prepared for Costa Rica by Fundación Neotrópica, a Costa Rican non-governmental organization, which is found at Annex 1 of the Memorial.¹¹³ Costa Rica relies entirely on the report of this Costa Rican environmental advocacy organization. It submits nothing from any non-Costa Rican source.

I. The Alleged “Social Cost” of Nicaragua’s Works

4.4 The primary focus of the Fundación Neotrópica report is to try to assign a “monetary value” to what it refers to as the “social cost” that allegedly resulted from Nicaragua’s works in the disputed area.¹¹⁴ It does this by attempting to value the “ecosystem goods and services” that it alleges were

¹¹² CRMC, pp. 69–70, Table 3.4.

¹¹³ Fundación Neotrópica, Monetary Valuation Report, 3 June 2016. CRMC, Vol. I, Annex 1. In addition, Fundación Neotrópica presented certain clarifications to its prior report, which are found at the explanatory addenda to the Monetary Valuation Report. Explanatory addenda to the Report Monetary Valuation of the environmental damages arising from the construction of *caños* and clearing of trees and vegetation performed by the Government of Nicaragua in the Costa Rican territory on Isla Portillos, as required by the Judgment of the International Court of Justice of 16 December 2015, 8 December 2016 (“Fundación Neotrópica, Explanatory Addenda to the Monetary Valuation Report”). CRMC, Vol. I, Annex 2.

¹¹⁴ Fundación Neotrópica, Monetary Valuation Report, 3 June 2016, p. 60, Table 14. CRMC, Vol. I, Annex 1 (at p. 146).

impacted by those activities.¹¹⁵ Fundación Neotrópica identifies six such goods and services:

- Standing timber;
- Other raw materials (fibre and energy);
- Gas regulation/air quality;
- Natural hazards mitigation;
- Soil formation/erosion control; and
- Habitat and nursery (biodiversity).¹¹⁶

4.5 Fundación Neotrópica assigns a monetary value to each of these services, which it applies each year for a 50-year period (discounted by 4% each succeeding year), on the ground that this represents the “time for recovery of the ecosystem to the state prior to the damage caused.”¹¹⁷ Based on this approach, Fundación Neotrópica claims that Nicaragua’s clearance of 2.48 hectares of trees and 3.71 hectares of underbrush caused an astronomical \$2,823,111.74 in environmental damage.¹¹⁸

4.6 This valuation—in excess of \$456,000 per hectare—bears no relationship to reality. To put it in perspective, Costa Rica’s construction of

¹¹⁵ *Ibid.*

¹¹⁶ *Ibid.*

¹¹⁷ *Ibid.*, p. 51.

¹¹⁸ Costa Rica claims that the report presents a “very conservative” valuation. CRMC, para. 3.17. That characterization is premised on its decision not to include valuations for certain alleged environmental services. *Ibid.* However, those services are plainly inapplicable here, e.g., “cultural and recreational services, including historic, spiritual, recreational, aesthetic, artistic services and science and recreation.” *Ibid.*, paras. 3.14, 3.17.

Route 1856 involved the felling of 83.2 hectares of forest¹¹⁹ and 2.3 hectares of “natural wetland systems.”¹²⁰ Were Fundación Neotrópica’s valuation to be applied to that area, it would value the environmental damage at nearly \$39 million. Yet, an ecological evaluation for the Government of Costa Rica concluded that the Road-related clearance had, at worst, only “moderate” environmental impacts.¹²¹

4.7 In light of this massive discrepancy, it is not surprising that Fundación Neotrópica’s report contains significant errors that dramatically overvalue impacts to the disputed area. Those errors are described in detail in the two Expert Reports that Nicaragua presents herewith. They are authored, respectively, by Professor Cymie Payne of Rutgers University and Mr. Robert Unsworth of Industrial Economics, Inc., who were legal and technical advisors to the UNCC’s environmental claims panel;¹²² and by Professor G. Mathias Kondolf, an expert geomorphologist who specializes in environmental river

¹¹⁹ “14.9 hectares of secondary forest and 68.3 hectares of altered primary forest,” according to Costa Rica’s 2015 “Follow-up and Monitoring Study.” Centro Científico Tropical (CCT), Follow-up and Monitoring Study Route 1856 Project-EDA Ecological Component, January 2015, p. 21. CRR (*Construction of a Road* case), Vol. III, Annex 14 (at p. 461).

¹²⁰ *Ibid.*

¹²¹ *Ibid.*, pp. 64–65, Table 6-1.

¹²² Cymie R. Payne & Robert E. Unsworth, Report on Environmental Damage Valuation, 26 May 2017 (“Payne & Unsworth Report”). NCMC, Vol. I, Annex 1.

management and restoration.¹²³ Their explanations of Fundación Neotrópica’s errors are summarized below.

A. Fundación Neotrópica’s Approach to Valuation Is Not an Appropriate Method for Valuing Environmental Damages

4.8 The premise of Fundación Neotrópica’s report is that it is appropriate to apply what it refers to as a “social cost” or “ecosystem services” approach to valuing the environmental impacts that were allegedly caused to the disputed area.¹²⁴ However, that approach is not designed to determine the quantum of environmental damages, and is manifestly unsuited for that purpose. As the Payne & Unsworth Report explains, “the monetary valuation approach used by Neotropica is not consistent with accepted practice in the field of natural resource damage assessment,” and the “damage estimate they generate using this method is not reliable or appropriate for assigning damages.”¹²⁵

4.9 In that regard, Fundación Neotrópica’s approach is intended only to serve a tool for helping policymakers appreciate the value of natural resources so as to aid their decision-making. As the Payne & Unsworth Report explains, it was designed to “draw attention to the contributions of ecosystems to people’s

¹²³ G. Mathias Kondolf, PhD, Review of Costa Rica’s Claims for Compensation in the Río San Juan Delta, May 2017 (“Kondolf Report (2017)”). NCMC, Vol. I, Annex 2.

¹²⁴ Fundación Neotrópica, Monetary Valuation Report, 3 June 2016. CRMC, Vol. I, Annex 1 (at pp. 87–158).

¹²⁵ Payne & Unsworth Report, Executive Summary. NCMC, Vol I, Annex 1.

well-being and motivate measurement of these contributions.”¹²⁶ Thus, although potentially useful for that limited purpose, “the economics literature has highlighted that it is an impractical framework where the focus is on *valuation* of ecosystem services.”¹²⁷

4.10 Valuation practice makes clear that the environmental services approach that is proposed by Fundación Neotrópica is *not* used to value environmental damages. For instance, the Payne & Unsworth Report explains that the European Union has developed a “toolkit” that is “intended to highlight best practices in environmental valuation”; notably, the EU toolkit “does not include the ‘ecosystem services’ approach used by Neotropica as an accepted methodology.”¹²⁸

4.11 Similarly, the recent *Federal Resources Management and Ecosystem Services Guidebook*, which was published by the National Ecosystem Services Partnership (an initiative developed with the support of the U.S. Environmental Protection Agency that includes “participation by more than 150 experts from U.S. federal agencies, universities, NGOs, and think tanks”) summarizes the theoretical and practical issues associated with Fundación Neotrópica’s approach.¹²⁹ Those deficiencies include the fact that the approach is

¹²⁶ *Ibid.*, p. 17.

¹²⁷ *Ibid.*

¹²⁸ *Ibid.*, p. 18.

¹²⁹ *Ibid.*, p. 20 & n. 78.

“expected to generate large errors or invalid estimates, particularly due to incorrect aggregation of marginal values, failure to account for spatial connections between ecosystems and their human beneficiaries and their change over time, and other generalization errors.”¹³⁰

4.12 Fundación Neotrópica attempts to justify the application of its proposed approach by citing to documents published by Ramsar. However, rather than supporting the use of Fundación Neotrópica’s method for valuing environmental damage, they confirm that it is only intended to be used for policymaking. One such study is entitled *Economic Valuation of Wetlands: A Guide for Policy Makers and Planners*; it describes the approach as a “tool to aid and improve wise use and management of global wetland resources” that assists policymakers in “weighing the advantages to be obtained by development with the damage which that development may do to wetlands.”¹³¹ The other Ramsar-published source cited by Fundación Neotrópica describes the approach as a method for “assessing the trade-offs between maintenance of wetlands and their

¹³⁰ *Ibid.*, p. 20 (quoting National Ecosystem Services Partnership (NESP), Federal Resource Management and Ecosystem Services Guidebook (2nd Rd., 2016), available at <https://nespguidebook.com> (*last visited* 26 May 2017)).

¹³¹ Edward B. Barbier et al., “Economic Valuation of Wetlands: A Guide for Policy Makers and Planners” (1997), pp. ix, vi. The document, which is cited by Fundación Neotrópica, is available at http://www.ramsar.org/sites/default/files/documents/pdf/lib/lib_valuation_e.pdf (*last visited* 25 May 2017).

conversion in decision-making.”¹³² Neither endorses its use for valuing environmental damage.

4.13 Indeed, apart from its own report on behalf of the Costa Rican Ministry of the Environment for use in a domestic mining case in Costa Rica, the Fundación Neotrópica report does not discuss any other instances in which the proposed approach has been used to value environmental damages. To the contrary, it acknowledges that, as of a 2006 survey published by the United Nations Environment Programme’s Regional Office for Latin America and the Caribbean, it “is not documented as having be[en] widely used.”¹³³ In fact, the UNEP report cites no instances in which the approach has been used to value environmental damage, as opposed to aid policymaking.¹³⁴

4.14 Nor is Fundación Neotrópica helped by citing a 1997 paper by Costanza *et al.* The Payne & Unsworth Report explains that a subsequent update,

¹³² Rudolf de Groot et al., “Valuing wetlands: Guidance for valuing the benefits derived from wetland ecosystem services” (November 2006), Ramsar Technical Report No. 3, CBD Technical Series No. 27, p. v. This document, which is cited by Fundación Neotrópica, is available at http://www.ramsar.org/sites/default/files/documents/pdf/lib/lib_rtr03.pdf (*last visited* 25 May 2017). Fundación Neotrópica also cites a 2010 report by The Economics of Ecosystems and Biodiversity (“TEEB”) of the United Nations Environment Programme, but that report is likewise focused on policymaking, not the valuation of damages. See Pushpam Kumar (ed.), “The Economics of Ecosystems and Biodiversity, Ecological and Economic Foundations” (2010), available on line at <http://www.teebweb.org/our-publications/teeb-study-reports/ecological-and-economic-foundations/> (*last visited* 25 May 2017).

¹³³ Fundación Neotrópica, Monetary Valuation Report, 3 June 2016, p. 37. CRMC, Vol. I, Annex 1 (at p. 123).

¹³⁴ See Castañón del Valle, M., “Valoración del Daño Ambiental” (2006), UNEP Regional Office for Latin America and the Caribbean, available on line at http://www.pnuma.org/gobernanza/documentos/Valoracion_Dano_Ambiental.pdf (*last visited* 27 May 2017).

published in 2014, “does not include damage valuation as one of the applications they claim this approach addresses.”¹³⁵ Rather, the update highlights the role that the approach can play in “heightening awareness and estimating the overall level of importance of ecosystem services.”¹³⁶

4.15 In short, the methodological approach used by Fundación Neotrópica is not a proper means for valuing environmental harm. It thus does not provide a reliable basis to value the environmental impacts of Nicaragua’s works.

B. Fundación Neotrópica’s Report Contains Serious Errors That Result in a Massive Over-Estimation of Damages

4.16 Even if, *quod non*, the environmental services approach proposed by Fundación Neotrópica was an appropriate method for valuing environmental damages, Fundación Neotrópica has implemented it incorrectly in ways that cause a dramatic overvaluation of impacts to the disputed area. The Payne & Unsworth Report details the serious flaws that pervade Fundación Neotrópica’s analysis. Nicaragua summarizes below three of the most significant errors, namely that the report: (i) wrongly assumes the presence of environmental services that are not actually present in the disputed area; (ii) improperly values the impacted area’s

¹³⁵ Payne & Unsworth Report, pp. 18–19. NCMC, Vol I, Annex 1.

¹³⁶ *Ibid.*, p. 19.

gas regulation/air quality services; and (iii) erroneously assumes that all impacts will last for 50 years.¹³⁷

i. Fundación Neotrópica’s Erroneous Assumptions in Regard to “Environmental Services”

4.17 Fundación Neotrópica erroneously assumes that Nicaragua’s works impacted environmental services that were not actually impacted, specifically (a) soil formation/erosion control, and (b) natural hazard mitigation. Fundación Neotrópica assumes that these services were harmed without analyzing whether they are actually provided in this environment. Notably, Costa Rica did not provide an expert report by Professor Thorne, even though, as a fluvial geomorphologist who has advised Costa Rica in regard to the environmental impacts of Nicaragua’s activities in the disputed area, he is competent to provide testimony on whether soil formation/erosion control or natural hazard mitigation services have been adversely impacted. By assuming, contrary to the evidence, that these services were harmed, Fundación Neotrópica wrongly assigns over \$1.3 million in damages to Nicaragua.

a) The Alleged Impact on “Soil Formation/Erosion Control”

¹³⁷ The Payne & Unsworth Report observes that although “Neotropica provides several tables that present inputs to the analysis they perform, as well as summary tables of results,” it is “not possible to replicate the results they get given the information provided.” *Ibid.*, p. 24. They also identify “several instances in which there appear to be errors in the calculations.” *Ibid.*

4.18 Fundación Neotrópica suggests that Nicaragua's works impacted what it describes as "soil formation/erosion control."¹³⁸ The alleged loss of these services comprises no less than \$1,179,924 of the compensation claim.¹³⁹

4.19 Costa Rica, however, is not entitled to *any* compensation for lost soil formation/erosion control because it has not suffered any such loss. It is undisputed that the *caños* cleared by Nicaragua in 2010 and 2013 rapidly re-filled with sediment, and are now covered with vegetation.¹⁴⁰ Moreover, as the Kondolf Report explains, since the area where the *caños* were cleared is a zone of deposition, it is not subject to erosion that needs to be controlled.¹⁴¹ Rather, the area is the constant recipient of huge amounts of sediment carried by the San Juan River.¹⁴² Given this reality, the Payne & Unsworth Report concludes that there is no basis for any valuation of lost erosion control or soil formation.¹⁴³

b) The Alleged Impact on Natural Hazards Mitigation

4.20 Equally baseless is Fundación Neotrópica's assumption that Nicaragua's works impacted the disputed area's ability to mitigate natural

¹³⁸ Fundación Neotrópica, Monetary Valuation Report, 3 June 2016, p. 60, Table 14. CRMC, Vol. I, Annex 1 (at p. 146).

¹³⁹ See Payne & Unsworth Report, p. 32 Exhibit 1. NCMC, Vol I, Annex 1.

¹⁴⁰ See paras. 2.8–2.11, 2.15–2.18, *supra*.

¹⁴¹ Kondolf Report (2017), pp. 2-4. NCMC, Vol. I, Annex 2.

¹⁴² *Ibid.*

¹⁴³ Payne & Unsworth Report, p. 29. NCMC, Vol I, Annex 1.

hazards, a service that it defines as “preventing and mitigating risk and natural hazards, such as storms and other adverse weather conditions.”¹⁴⁴ Fundación Neotrópica claims that the lost value of this service is \$184,581.¹⁴⁵

4.21 Costa Rica, however, is not entitled to any compensation for lost natural hazard mitigation because no such service has been lost. Indeed, Fundación Neotrópica identifies no natural hazards that the affected area was mitigating; instead, it only claims that, in general, natural resources can provide “flood and storm protection.”¹⁴⁶

4.22 In fact, the disputed area plays no role in mitigating natural hazards,¹⁴⁷ and Fundación Neotrópica never explains how this wetland, which Costa Rica and Ramsar have described as “flooded grassland” and “swamp or flooded forests,”¹⁴⁸ could provide flood protection. Nor does Fundación Neotrópica explain how Nicaragua’s works could have impacted any natural hazard mitigation services.¹⁴⁹ Indeed, as can be seen in **Figures 2.3, 2.6, and 2.7**

¹⁴⁴ Fundación Neotrópica, Monetary Valuation Report, 3 June 2016, Table 3. CRMC, Vol. I, Annex 1 (at p. 103).

¹⁴⁵ *Ibid.*, Table 14.

¹⁴⁶ *Ibid.*, p. 18.

¹⁴⁷ Even if it did, the nearby towns and infrastructure that would benefit from such services are located in Nicaragua, not Costa Rica, a fact that Fundación Neotrópica accepts. *See ibid.*, p. 53; Fundación Neotrópica, Explanatory Addenda to the Monetary Valuation Report, 8 December 2016, pp. 5–6. CRMC, Vol. I, Annex 2 (at pp. 165–166). *See also* Kondolf Report (2017), pp. 4–5. NCMC, Vol. I, Annex 2.

¹⁴⁸ *E.g.*, 2014 Ramsar Report, p. 6. CRMC, Vol. II, Annex 22 (at p. 362).

¹⁴⁹ Kondolf Report (2017), p. 4. NCMC, Vol. I, Annex 2.

above, when the disputed area was struck by Hurricane Otto in November 2016, Nicaragua's works did not affect the harm caused by the storm.¹⁵⁰ The Payne & Unsworth Report thus concludes that "this category of loss should not be included in the damage claim being made by Costa Rica."¹⁵¹

ii. Fundación Neotrópica Improperly Values "Gas Regulation/Air Quality Services"

4.23 Fundación Neotrópica claims that Nicaragua's works impacted the area's ability to regulate gas and air quality, a service that it defines as the contribution of "forest cover and marine ecosystems" to "air purification" and "the balancing of greenhouse gases."¹⁵² According to Fundación Neotrópica, this caused nearly \$1 million (\$937,509) in damage.¹⁵³ Like its other calculations, this claim is so exorbitant as to verge on pure fantasy.

4.24 In particular, Fundación Neotrópica dramatically overestimates the value of any gas regulation services that were allegedly impacted by Nicaragua's works. Fundación Neotrópica selects the highest value from the literature it surveyed—\$14,955 per hectare—without demonstrating that the habitat it describes is similar to the disputed area and ignoring studies that assign lower

¹⁵⁰ *Ibid.*, p. 5.

¹⁵¹ Payne & Unsworth Report, p. 30. NCMC, Vol. I, Annex 1.

¹⁵² Fundación Neotrópica, Monetary Valuation Report, 3 June 2016, p. 18. CRMC, Vol. I, Annex 1 (at p. 104).

¹⁵³ Payne & Unsworth Report, p. 32 Exhibit 1. NCMC, Vol. I, Annex 1.

values.¹⁵⁴ Fundación Neotrópica provides no cogent justification for this choice, which is particularly inexplicable given that it relies on an unpublished, non-peer reviewed master's thesis by a Costa Rican student, “[i]n spite of finding several reference studies”¹⁵⁵ where the value per hectare was much lower: between \$105.11 and \$3,367.07.¹⁵⁶

4.25 Even if Fundación Neotrópica’s selection of the highest value from the literature were justified, Fundación Neotrópica misinterprets the nature of that value. As the Payne & Unsworth Report explains, the \$14,955 per hectare figure represents the total value of all carbon sequestered in a hectare, including “in vegetation, in soil, in leaf litter, and in woody debris.”¹⁵⁷ It thus reflects the *maximum* value of carbon-related impacts per hectare that could, in theory, have been caused by Nicaragua’s works, assuming those works had released into the atmosphere all carbon that was sequestered. Even if that had occurred for the 2.91 hectares where Fundación Neotrópica considers gas regulation and air quality services to have been impacted, the damages would only be \$47,778, or

¹⁵⁴ Fundación Neotrópica, Monetary Valuation Report, 3 June 2016, p. 53 & Appendix 3. CRMC, Vol. I, Annex 1 (at p. 139, 158).

¹⁵⁵ Fundación Neotrópica, Explanatory Addenda to the Monetary Valuation Report, 8 December 2016, p. 5. CRMC, Vol. I, Annex 2 (at p. 165).

¹⁵⁶ Fundación Neotrópica, Monetary Valuation Report, 3 June 2016, Appendix 3. CRMC, Vol. I, Annex 1 (at p. 158).

¹⁵⁷ Payne & Unsworth Report, p. 27 (quoting the International Union for the Conservation of Nature). NCMC, Vol 1, Annex 1.

approximately five percent of the \$937,509 that Costa Rica claims in compensation for these services.¹⁵⁸

4.26 Further, Fundación Neotrópica erroneously assumes that the benefits of gas regulation accrue to Costa Rica alone; in fact, the benefits of forests, wherever they are located, that reduce the impacts of greenhouse gas emissions are distributed worldwide. As the Payne & Unsworth Report explains, “the social cost of carbon . . . reflects the value of avoided impacts *to the world’s population*, not simply the avoided costs to citizens of Costa Rica.”¹⁵⁹ Thus, to the extent Costa Rica could claim any compensation for losses of such benefits, it would only be entitled to its share of the global total, which is minuscule.

iii. Fundación Neotrópica Erroneously Assumes That All Impacts Last for 50 Years

4.27 Another fundamental flaw in Fundación Neotrópica’s analysis is that, as noted above, for each environmental service that it claims has been impacted, it assigns an initial value which it applies over a period of 50 years, discounted by 4% each year. The ostensible basis for doing so is the assumption that, in the disputed area, 50 years is the “documented term for minimum recovery

¹⁵⁸ *Ibid.* p. 32 Exhibit 1.

¹⁵⁹ *Ibid.* p. 28 (emphasis in original).

of the ecosystem's ability to provide the ecosystem services lost.”¹⁶⁰ That assumption, however, is not based on reality.

4.28 *First*, as shown above, Costa Rica cannot claim *any* compensation for alleged impacts to soil formation/erosion control, or to natural hazard mitigation, because those services are inapplicable in this environment and thus have not been lost.¹⁶¹ Costa Rica is therefore certainly not entitled to compensation for impacts to those services for 50 years. Correcting this error reduces the overall valuation significantly: the 50-year valuation of impacts to these services accounts for more than 40 percent of Costa Rica’s total claim for “social costs.”¹⁶²

4.29 *Second*, with respect to the value of the trees that were felled, Fundación Neotrópica claims that Costa Rica is owed the astronomical amount of \$462,490, even though, as the Payne & Unsworth Report explains, the highest possible market value of that standing timber (using Fundación Neotrópica’s assumptions about the number and species of trees) is only \$30,175.¹⁶³ Fundación Neotrópica comes to this conclusion by assuming that the timber is harvested every year for 50 years. As the Payne & Unsworth Report explains, this is a

¹⁶⁰ Fundación Neotrópica, Monetary Valuation Report, 3 June 2016, p. 59. CRMC, Vol. I, Annex 1 (at p. 145). *See also* Kondolf Report (2017), pp. 5-6. NCMC, Vol. I, Annex 2.

¹⁶¹ *See supra* paras. 4.17–4.22.

¹⁶² *See* Payne & Unsworth Report, p. 32 Exhibit 1. NCMC, Vol 1, Annex 1.

¹⁶³ *Ibid.*

serious error because trees can only be harvested once.¹⁶⁴ Thus, even assuming, *arguendo*, that the other elements of Costa Rica's calculation are accurate (which they are not), correcting this error reduces the valuation by approximately 95%.¹⁶⁵

4.30 In reality, even that may overestimate the value of the timber because, as the Payne & Unsworth Report explains, there is no evidence that Fundación Neotrópica has accounted for the cost that would be required to harvest the timber and transport it to market, which contravenes accepted valuation methodology.¹⁶⁶ Moreover, no actual market for the timber has been established, rendering the valuation entirely speculative.¹⁶⁷

4.31 *Third*, it is incorrect for Costa Rica to apply its already-inflated air quality and gas regulation valuation every year for fifty years. As the Payne &

¹⁶⁴ *Ibid.*, pp. 24–25.

¹⁶⁵ See *ibid.*, p. 32 Exhibit 1.

¹⁶⁶ *Ibid.* p. 25.

¹⁶⁷ *Ibid.* Fundación Neotrópica introduces further error by assuming that the tree data collected during the “census” of the 2010 *caño* (whose accuracy Nicaragua has repeatedly disputed) can be applied to the 2013 *caño* as well: “the tree estimate for [the eastern 2013 *caño*] ... was based on the inventory for *Caño Pastora* [*i.e.*, the 2010 *caño*.]” Fundación Neotrópica, Explanatory Addenda to the Monetary Valuation Report, 8 December 2016, p. 9. CRMC, Vol. I, Annex 2 (at p. 169). This is also apparent from Table 16 of the Fundación Neotrópica report, which (according to the correction made at p. 3 of Annex 2) assumes that the same species were felled during the construction of both *caños*. The record contains no basis for assuming that the location of the 2013 *caño* contained either the same types of trees or the same distribution of trees as the location of the 2010 *caño*. To the contrary, Professor Thorne explained to the Court during the oral hearings that “the vegetation through which the first *caño* was cut, in my opinion, differed from that of the second and third *caños*, which are much further north and on land which is much younger ...” Hearing on Merits, CR 2015/3, p. 42 (Thorne). And Costa Rica reported to Ramsar in March 2014 only that “several *Pterocarpus officinalis* trees and *Raphia taedigera* plants had been cut down” during the construction of the 2013 *caño*. Costa Rican Ministry of the Environment and Energy, Final Report for the Secretariat of the Ramsar Convention, March 2014, p. 8. Compliance Report, Attachment CR-1.

Unsworth Report explains, the \$14,955 per hectare value that Fundación Neotrópica uses is the value of all the sequestered carbon, which could be released into the atmosphere only once.¹⁶⁸ Moreover, as noted above, it is unreasonable for Fundación Neotrópica to assume that the impacted area will provide *no* gas regulating or air quality services for a full 50 years, given the significant regrowth of vegetation that has occurred.¹⁶⁹

4.32 *Fourth*, it is wrong to assume, as Fundación Neotrópica does, that it will take 50 years for impacts to the disputed area’s “habitat and nursery (biodiversity)” and “raw materials (fibre and energy)” to be resolved. Given the rapid recovery that the disputed area has undergone, as discussed in paragraphs 2.8–2.11 and 2.15–2.18, it is evident that its ability to provide “habitat and nursery (biodiversity)” and “other raw materials (fibre and energy),” has recovered.¹⁷⁰ Thus, even if Fundación Neotrópica had accurately assigned an initial value to those goods and services of \$1,896 and \$832, respectively,¹⁷¹ it vastly inflated the

¹⁶⁸ See Payne & Unsworth Report, p. 28. NCMC, Vol 1, Annex 1.

¹⁶⁹ *Ibid.*

¹⁷⁰ See Kondolf Report (2017), pp. 1, 3, 6. NCMC, Vol. I, Annex 2.

¹⁷¹ Even these one-year values are unsupported and likely overstated. With regard to alleged “habitat and nursery (biodiversity)” services, Fundación Neotrópica’s year-one valuation is based on the transfer of values from “a study performed for policy purposes in Thailand – with differing ecological, economic, and cultural attributes.” Payne & Unsworth Report, p. 31. NCMC, Vol 1, Annex 1. With regard to the “other raw materials (fibre and energy),” Fundación Neotrópica failed to establish either that the values transferred (which they simply average from a range of sources) come from analogous habitats or that a market for these raw materials actually exists in the context of the disputed area. *Ibid.* pp. 25–26.

valuation by claiming \$40,730 and \$17,877, respectively, when it assumed that losses will extend for 50 years.¹⁷²

II. Future “Restoration Measures”

4.33 Fundación Neotrópica further assumes that Costa Rica is entitled to a one-time “restoration cost” of \$57,634.08.¹⁷³ Nearly the entire amount (\$54,925.69) consists of the “value of the replacement of the dredged soil” that was removed when the *caños* were cleared.¹⁷⁴

4.34 However, as described above in paragraphs 2.8–2.11 and 2.15–2.18, there is no need to replace this soil because both *caños* are already filled in – the 2010 *caño* as a result of natural processes that were completed in mid-2011, and the 2013 *caño* as a result of the dyke that was constructed in 2015. Fundación Neotrópica fails to acknowledge either of these facts.¹⁷⁵

4.35 Indeed, there is no indication in the Memorial that Costa Rica has any intention to carry out further restoration work, and none of the four reports that are cited by Fundación Neotrópica as providing “the recommendation of

¹⁷² See *ibid.* p. 32 Exhibit 1.

¹⁷³ Fundación Neotrópica, Monetary Valuation Report, 3 June 2016, pp. 61, 63. CRMC, Vol. I, Annex 1 (at p. 147, 149).

¹⁷⁴ *Ibid.*, p. 61. \$33,610.69 pertains to the 2010 *caño*; \$21,315.00 pertains to the 2013 *caño*.

¹⁷⁵ The remaining \$2,708.39 of the total consists of a “\$929.79 per ha for restoration cost of a wetland in the Costa Rica-Nicaragua cross-border wetland area.” *Ibid.* It claims this cost is associated with “the repopulation of species, control, monitoring and infrastructure.” *Ibid.*, p. 52 (at p. 138). However, Fundación Neotrópica does not identify any restoration that is occurring or planned to occur.

restoration measures” suggest that restoration should include measures beyond constructing the dyke that was installed in 2015.¹⁷⁶

III. Remediation of the 2013 Eastern Caño

4.36 Separate from its claim for lost environmental services, Costa Rica seeks \$195,671.02 in compensation for costs it allegedly incurred in connection with construction of the dyke across the 2013 eastern *caño* in 2015. Nicaragua accepts that compensation may be appropriate for costs that were reasonably incurred. However, Costa Rica’s claim is inflated.

4.37 Specifically, Costa Rica seeks \$156,446.27 in compensation for “construction materials and hiring of a private civilian helicopter to transport personnel and materials.”¹⁷⁷ This includes more materials than were actually used to build the dyke. Annex 4 to the Memorial accepts that “[t]he construction required fewer materials than those planned in the original design,” and that “[l]eftover material included sandbags and sacks filled with sand at the delta of the Agua Dulce lagoon, with a total of 2451 synthetic sandbags mostly contained in 79 sacks, and 564 burlap sandbags contained in 25 sacks.”¹⁷⁸ It further indicates that the surplus may be “used to contain erosion at the edge of Agua

¹⁷⁶ See *ibid.*, p. 51 (citing sources number 4, 10, 12, and 13 in Table 2). CRMC, Vol. I, Annex 1 (at p. 137).

¹⁷⁷ CRMC, Table 3.4 (at p. 69).

¹⁷⁸ 2015 MINAE Report, p. 26. CRMC, Vol. I, Annex 4 (at p. 228).

Dulce lagoon near its mouth.”¹⁷⁹ The cost for these materials cannot reasonably be assigned to Nicaragua. Removing them from the claim reduces it by at least \$9,000.¹⁸⁰

4.38 Costa Rica also seeks \$33,041.75 in compensation for three post-dyke construction overflights (on 9 June, 8 July, and 3 October 2015).¹⁸¹ Costa Rica claims that the purpose of these flights was “to assess the effectiveness of the works that had been completed to construct the dyke on the eastern caño.”¹⁸² However, the overflights, at least in part, were for purposes unrelated to the activities that the Court determined were wrongful. Each overflowed “other points of interest in the *Humedal Caribe Noroeste*,”¹⁸³ including at least one “[o]verflight of the border road.”¹⁸⁴ These expenses are therefore not compensable.

¹⁷⁹ *Ibid.*

¹⁸⁰ Costa Rica has presented a list of the supplies purchased for the dyke construction works, including the quantity purchased and their unit price. CRMC, Vol. II, Annex 15 (at p. 157). That list can be compared with the list of “Materials used for the construction of the dyke at the artificial caño” that is included in Table 3 of the 2015 MINAE Report (CRMC, Vol. I, Annex 4, at p. 224). Such a comparison indicates at least \$9,112.50 worth of the materials went unused.

¹⁸¹ CRMC, Table 3.4 (at p. 70).

¹⁸² *Ibid.*, para. 3.42.

¹⁸³ See Costa Rica’s National Commission for Risk Prevention and Emergencies Attention (CNE), Department of Reconstruction Processes, Report of Expenses incurred by the CNE, 4 April 2016, pp. 145, 147–148, 152. CRMC, Vol. II Annex 15 (at pp. 162, 164–165, 169).

¹⁸⁴ See CNE, Reports of Expenses (2016), p. 154. CRMC, Vol. II, Annex 15 (at p. 171).

IV. The Proper Valuation of Material Damages Caused by Nicaragua’s Works

4.39 The Payne & Unsworth Report explains that the “standard approach in natural resource damage assessment is to value damage claims using restoration or replacement costs.”¹⁸⁵ For instance, this was the approach that the UNCC’s environmental claims panel followed for the “largest environmental damage claims” that it was called upon to adjudicate, which concerned “[d]amage to Saudi Arabia’s coastal environment” caused by oil spills.¹⁸⁶ The panel’s award had two components: (a) “replacement costs,” which were “valued by the cost of shoreline reserves that would provide additional ecological services to replace those that were lost”; and (b) “restoration costs,” which were “valued by the cost of a remediation plan tailored to the injured sites.”¹⁸⁷

4.40 The Payne & Unsworth Report explains that “such an approach is appropriate for valuing Costa Rica’s claims for environmental damage” since it would “provide an accurate measure of loss” while avoiding “the weaknesses inherent in Neotropica’s approach.”¹⁸⁸

4.41 With respect to *replacement costs*, the Payne & Unsworth Report observes that “[i]t is common in the context of natural resource damage

¹⁸⁵ Payne & Unsworth Report, p. 33. NCMC, Vol 1, Annex 1.

¹⁸⁶ *Ibid.*

¹⁸⁷ *Ibid.*

¹⁸⁸ *Ibid.*

assessment for parties to use payments to land conservation banks, such as wetland banks, or to pay landowners to conserve or protect habitat as a means to offset environmental harms.”¹⁸⁹ This is a “favoured approach because these actions assure that the same level of environmental services are available as would have been but for the harm in question.”¹⁹⁰ As noted, this was achieved by the UNCC in regard to damage to Saudi Arabia’s coastline by the award of compensation in an amount sufficient to establish reserves in comparable areas.

4.42 Use of a similar approach would be appropriate and straightforward to implement in regard to damage caused to the disputed area because, as the Payne & Unsworth Report explains, “Costa Rica has an active market that pays landowners and communities for the management of habitat to provide ecosystem services.”¹⁹¹

4.43 In that regard, under Costa Rica’s protection scheme, the highest price paid in 2012 was \$294/hectare/year, which corresponds to \$309/hectare/year in 2017 dollars.¹⁹² Payne & Unsworth explain that if this amount were applied to the 6.19 hectares that Costa Rica alleges were injured by Nicaragua’s works, and applied over the course of 20 to 30 years (a reasonable length of time given the

¹⁸⁹ *Ibid.*

¹⁹⁰ *Ibid.*

¹⁹¹ *Ibid.*

¹⁹² *Ibid.*

recovery of the impacted areas¹⁹³), “this would imply an ecosystem service replacement cost of \$1,913/year, or a present value for 20 to 30 years of USD 27,034 to USD 34,987.”¹⁹⁴

4.44 On this basis, the Payne & Unsworth Report concludes that Costa Rica is entitled to no more than \$34,987 in compensation for replacement costs.¹⁹⁵

4.45 With respect to *restoration costs*, the amount claimed by Costa Rica consists of expenses incurred in connection with the construction of the dyke in 2015 to remediate the 2013 eastern *caño*. Nicaragua accepts that it should compensate Costa Rica for such costs, except for materials not used in the construction of the dyke and overflights that involved monitoring unrelated locations. When those uncompensable expenses are subtracted from Costa Rica’s claim, the result is a compensable restoration cost of no more than \$153,517.¹⁹⁶

4.46 Accordingly, consistent with standard environmental claims valuation practices, including that of the UNCC, Nicaragua is responsible for compensating Costa Rica for its claims with respect to environmental impacts in an amount no greater than \$188,504. This represents the cost of purchasing the protection of an area equivalent to the area that was impacted by Nicaragua’s

¹⁹³ Kondolf Report (2017), pp. 3–4. NCMC, Vol. I, Annex 2.

¹⁹⁴ Payne & Unsworth Report, p. 34. NCMC, Vol. I, Annex 1.

¹⁹⁵ *Ibid.*, pp. 33–34.

¹⁹⁶ *Supra* paras. 4.36–4.38.

works (\$34,987),¹⁹⁷ plus the reasonable costs of remediation work carried out by Costa Rica in the 2013 eastern *caño* (\$153,517).¹⁹⁸

¹⁹⁷ *Supra* para. 4.44.

¹⁹⁸ *Supra* para. 4.45. Costa Rica claims pre- and post-judgment interest on the asserted ground that it is “well-established in international practice.” CRMC, para. 2.29. However, “an injured State has no automatic entitlement to the payment of interest”; rather, the “awarding of interest depends on the circumstances of each case [and] in particular, on whether an award of interest is necessary in order to ensure full reparation.” ARSIWA, Art. 38, cmt. 7. Costa Rica nowhere explains why the circumstances of this case warrant the award of interest. Nor has it attempted to justify the 6% interest rate it requests.

CHAPTER 5: COSTA RICA’S CLAIMS FOR ALLEGED MONITORING

5.1 In this Chapter, Nicaragua responds to Costa Rica’s claims for reimbursement for its purported “monitoring” expenses, almost all of which are actually the salaries of Costa Rican security forces deployed to protect against the imagined threat of Nicaragua reoccupying the disputed area and, especially, occupying other parts of Costa Rica. As such, they are unrelated to the material damage caused by Nicaragua’s works in the disputed area and entirely inappropriate claims for compensation.

I. Claims for the Wages of Security Personnel

5.2 Nearly the entirety of Costa Rica’s claim for monitoring (\$3,092,834.17) consists of wages that it claims to have paid to security personnel who were deployed between March 2011 and December 2015 to police posts that Costa Rica constructed at Laguna Los Portillos and Laguna Agua Dulce.¹⁹⁹ None of these costs are compensable.

¹⁹⁹ CRMC, para. 3.29(c); Costa Rica’s Ministry of Security, Department of Salaries and Wages, Report of Salaries paid to Police personnel from March 2011 to December 2015 (“Ministry of Security, Department of Salaries and Wages, Salaries Report”). CRCM, Vol. II, Annex 13.

A. Costa Rica’s Deployment of Security Personnel Was Not Proximately Caused by Nicaragua’s Works in the Disputed Area

5.3 The police deployment for which Costa Rica claims compensation had nothing to do with any environmental harm caused by Nicaragua, or even Nicaragua’s presence in the disputed area; rather, it was to provide security against future attempts by Nicaragua to occupy the disputed area or, especially, *other* parts of Costa Rica, including to defend Costa Rica against a fantasized Nicaraguan invasion. To confirm that this is the case, the Court need only look to the documents that Costa Rica itself has presented in support of its compensation claim.

5.4 In particular, the materials that Costa Rica provided to Nicaragua in June 2016, which set out the details of its compensation claim, explain the \$3,092,834.17 claimed for “Wages of Law Enforcement [Fuerza Pública] and Border Police [Policía de Fronteras] forces” by stating that the police were deployed “to avoid Nicaragua claiming sovereignty over additional territories in the region”²⁰⁰ It further states that “[t]hese police forces were to surveil the actions of the Nicaraguan army”²⁰¹ These statements by themselves defeat

²⁰⁰ Summary Table of the Information Provided by the Institutions Responsible for Attending to Harm Caused by Nicaragua in the Zone of Isla Portillos (undated, provided to Nicaragua on 7 June 2016), p. 2, Rows 8, 9. NCMC, Vol. I, Annex 3. Costa Rica also cited the Court’s Provisional Measures Order of 8 March 2011 as a justification. However, as explained *infra*, that claim is untrue.

²⁰¹ *Ibid.*, Row 8.

Costa Rica’s claim. It is an admission that the “Fuerza Publica” and the “Policia de Frontera” were *not* deployed in response to, or to remediate, the material damage that Nicaragua’s works caused to the disputed area.

5.5 Annex 13 of Costa Rica’s Memorial, which is a chart listing the police officers for whose salaries Costa Rica seeks compensation, is also revealing. It bears the title “Ministry of Security, Personnel Posted in Delta Costa Rica and Agua Dulce *Because of the Nicaraguan Invasion*” (emphasis added), which further demonstrates that Costa Rica is seeking compensation for officers it deployed because of a threatened “Nicaraguan invasion.”²⁰² Consistent with that purpose, Annex 13 also establishes that the personnel were stationed at locations far removed from the disputed area. Agua Dulce is approximately 8 kilometres away from the disputed area; Delta Costa Rica is approximately 19 kilometres away. Notably, no police presence at Isla Portillos is mentioned.

5.6 The Memorial itself confirms that Costa Rica’s deployment of forces to or near Isla Portillos was not a response to Nicaragua’s works in the disputed area. Paragraph 3.29(c) states that Costa Rica had to “staff these posts [at Laguna de Agua Dulce and Isla Portillos] with sufficient personnel to monitor the actions of Nicaragua *in the vicinity of* (and in) *the disputed territory* and to

²⁰² Ministry of Security, Department of Salaries and Wages, Salaries Report. CRCM, Vol. II, Annex 13 (at p. 124).

provide security to the area, as ordered by the Court.”²⁰³ The actions these forces were deployed to monitor, as Costa Rica’s own documents reveal, were any preparations or other movements by Nicaraguan military personnel that might signal an intention to enter and occupy Costa Rican territory.²⁰⁴ As Costa Rica explained in an July 2013 report to the Ramsar Secretariat, the police were deployed because of “hostile acts” that, it claimed, “evidenced Nicaragua’s intention to entirely ignore the border regime.”²⁰⁵ These included, *inter alia*, that Nicaragua had “threatened to reclaim the Costa Rican province of Guanacaste.”²⁰⁶ Costa Rica’s report described its construction of surveillance towers at the posts for which it is now seeking compensation, each equipped with “long range cameras (15 km)” that were intended “to serve as a support for the *national security strategy* in the border area.”²⁰⁷

5.7 These deployments thus had nothing to do with remedying or even responding to the environmental damage Nicaragua’s works are said to have caused in the disputed area, or with Nicaragua’s presence in the disputed area.

²⁰³ CRMC, para. 3.29(c) (emphasis added).

²⁰⁴ See Summary Table of the Information Provided by the Institutions Responsible for Attending to Harm Caused by Nicaragua in the Zone of Isla Portillos (undated, provided to Nicaragua on 7 June 2016), Rows 8, 9. NCMC, Vol. I, Annex 3.

²⁰⁵ Costa Rican Ministry of Foreign Affairs, New Works in the Northeast Caribbean Wetland, Report for the Executive Secretariat of the Ramsar Convention on Wetlands, July 2013 (“Costa Rica’s Report to Ramsar Convention Secretariat, July 2013”), p. 3. CRMC, Vol. I, Annex 3 (at p. 180).

²⁰⁶ *Ibid.*

²⁰⁷ CRMC, para. 3.26; Costa Rica’s Report to Ramsar Convention Secretariat, July 2013, p. 6 (emphasis added). CRMC, Vol. I, Annex 3 (at p. 183).

B. Costa Rica’s Security Forces Were Not Deployed Because of the Court’s 8 March 2011 Provisional Measures Order

5.8 Costa Rica cannot justify seeking compensation from Nicaragua for its police deployment by invoking the Court’s Provisional Measures Order of 8 March 2011.²⁰⁸ That Order directed the parties to monitor the disputed area so as to “prevent the development of criminal activity in the disputed territory in the absence of any police or security forces of either Party.”²⁰⁹ In the first place, the Costa Rican deployment could not have been motivated by the Provisional Measures Order because it *preceded* the Order: deployments to Laguna de Agua Dulce began in December 2010; the Court did not indicate provisional measures until 8 March 2011.

5.9 Second, the Order directed monitoring in order to “*prevent the development of criminal activity in the disputed territory* in the absence of any police or security forces of either Party.”²¹⁰ Thus, if Costa Rica had deployed security personnel to the disputed area in response to (as distinct from prior to) the Court’s Order, it would have been appropriate only for the purpose of preventing criminal activity – not for the purpose of monitoring Nicaragua’s works or any related environmental damage caused by such works. In fact, at the time the Order was issued in March 2011, Nicaragua’s works had already been completed

²⁰⁸ CRMC, para. 3.26

²⁰⁹ Provisional Measures Order of 8 March 2011, para. 78.

²¹⁰ *Ibid.* (emphasis added).

and its personnel had been removed from the disputed area. The Order plainly reflects this. The removal of Nicaraguan personnel from the area left it completely devoid of any security presence, and ripe for criminal activity. That explains why the Court, which otherwise prohibited most entry into the area, directed the Parties to monitor it to “prevent the development of criminal activity.”²¹¹

5.10 The Witness Statement of Costa Rica’s former Minister of Public Security, Mr. Mario Zamora Cordero, confirms that the deployment of Costa Rica’s security forces was not part of a plan to prevent criminal activity in the disputed area in response to the Court’s Order. To the contrary, it was intended to provide security against Nicaragua occupying other parts of Costa Rica.²¹² He states that “Costa Rica placed police personnel in the vicinity of Isla Portillos in order to provide security and assistance to communities in that area, and, where possible, to protect Costa Rican territory from further advances of Nicaragua military forces.”²¹³

5.11 To be sure, the former Minister’s Witness Statement (which was prepared for use in this litigation six years after the events it recounts) asserts that the long-term deployment of security personnel to the disputed area was a

²¹¹ *Ibid.*

²¹² See Witness Statement of Mr. Mario Zamora Cordero, Former Minister of Public Security of Costa Rica, 22 March 2017 (“Zamora Cordero Witness Statement (2017)”). CRMC, Vol. I, Annex 5 (at p. 238).

²¹³ *Ibid.*

response to the Court’s indication of provisional measures.²¹⁴ But, even if that were so, any proper response to the Court’s Order would have been directed at preventing criminal activities in the disputed area, not at Nicaragua’s works in the area or at the damage they are alleged to have caused.

5.12 In any event, the former Minister’s Statement in this regard is contradicted by contemporaneous official Costa Rican government records. In April 2011, Mr. Zamora’s predecessor as Minister of Public Security, Mr. José María Tijerino Pacheco, prepared a report that detailed what had been accomplished during his tenure as Minister. He explained that “[a]s a result of events on the northern border in recent months, the urgent goal was established of reactivating Border Police in order to ensure the security of citizens and respect for national sovereignty.”²¹⁵ That motivation, he made clear, applied to “the entire land border line” and to the “infrastructure needed for the operation,” which included the 45 “police outposts” that had been or would be constructed.²¹⁶ Significantly, Minister Tijerino’s report did *not* refer to the Court’s Provisional Measures Order as a reason for the police deployment. Nor did the Minister refer to any need to monitor or otherwise address Nicaragua’s works in the disputed area or any alleged damage they might have caused.

²¹⁴ *Ibid.* (“After the Court indicated Provisional Measures on [8 March 2011], I gave instructions for the planning of a long term police presence, in order to provide security to what was then termed the ‘disputed territory.’”).

²¹⁵ José María Tijerino Pacheco, Outgoing Report, Period 8 May 2010 to 30 April 2011, Ministries of State and Police and Public Security, April 2011, pp. 26–27. NCMC, Vol. I, Annex 4.

²¹⁶ *Ibid.*

5.13 Moreover, any such monitoring, even if done in response to the Order of 8 March 2011, *quod non*, was disproportionate to any need to prevent criminal activity in the disputed area. Indeed, prior to its deployment, Costa Rica had never stationed police in, or anywhere near, the disputed area.²¹⁷ There was certainly no cause to station a large number of personnel there at two separate posts, twenty-four hours a day, seven days a week. And there is no cause whatsoever to ask Nicaragua to pay for these activities.

C. The Wages Allegedly Paid to Security Personnel Would Have Been Paid Even in the Absence of Nicaragua's Works

5.14 Even if the salaries of the Costa Rican police were, in principle, compensable, a State is only entitled to compensation for extraordinary expenses, such as the costs of hiring new personnel or the payment of overtime. For

²¹⁷ See Affidavit of Suban Antonio Yuri Valle Olivares (Police), 15 December 2010, p. 1 (“The only Costa Rican presence has been the rural guard or public force post located in the Delta, from the San Juan River Delta throughout the river’s mouth we never saw any presence of Costa Rican civil authorities or public force.”). NCM, Vol. III, Annex 84 (at p. 360); *see also* Affidavit of José Magdiel Pérez Solis (Police), 15 December 2010, p. 1 (“Since two thousand and eight (2008), up to this day, I have never seen Costa Rican presence in the zone.”). NCM, Vol. III, Annex 80 (at p. 336); Affidavit of Gregorio de Jesús Aburto Ortiz (Police), 15 December 2010, p. 2 (“I have to say that during 2004 and 2005 there was no presence of Costa Rican civil authorities or public forces in the Harbor Head zone.”). NCM, Vol. III, Annex 81 (at p. 343); Affidavit of Luis Fernando Barrantes Jiménez (Police), 15 December 2010, p. 1 (“[W]e never found the presence of any Costa Rican civil authority or public force...”). NCM, Vol. III, Annex 82 (at p. 348); Affidavit of Douglas Rafael Pichardo Ramírez (Police) p. 2 (“During our constant patrol activities throughout all the Harbor Head zone and its streams, Indio River, the lagoon and the San Juan River we never found any Costa Rican authorities neither civil servants.”). NCM, Vol. III, Annex 83 (at p. 355).

example, the UNCC's F2 Panel held that only incremental salary and overtime payments were compensable.²¹⁸ It defined these incremental payments as:

payments made over and above normal salary and overtime payments made to regular staff as a direct result of Iraq's invasion and occupation of Kuwait, as well as salary and overtime payments to staff specifically recruited as a result of Iraq's invasion and occupation of Kuwait. In all cases, the salary and overtime payments must also be reasonable in order to be compensable.²¹⁹

Other UNCC panels likewise held that only personnel costs over and above what the claimant would have incurred but for the internationally wrongful act are compensable.²²⁰ This flows inexorably from the requirement that an internationally wrongful act be the cause-in-fact of a loss for compensation to be

²¹⁸ United Nations Compensation Commission, Report and Recommendations made by the Panel of Commissioners concerning the Second Instalment of "F2" Claims, U.N. Doc. S/AC.26/2000/26 ("UNCC, Report and Recommendations on the Second Instalment of "F2" Claims"), 7 December 2000, paras. 52–58.

²¹⁹ *Ibid.*, para. 53.

²²⁰ E.g., United Nations Compensation Commission, Report and Recommendations made by the Panel of Commissioners concerning the Second Instalment of "F4" Claims, U.N. Doc. S/AC.26/2002/26 ("UNCC, Report and Recommendations on the Second Instalment of "F4" Claims"), 3 October 2002, para. 30 (adopting the approach of "other panels that have held that salaries and other expenses incurred by a claimant in respect of its personnel are compensable if the expenses were incurred as a direct result of Iraq's invasion and occupation of Kuwait and were extraordinary in nature (i.e. if they were over and above what would have been incurred by the claimant in the normal course of events)."); see also United Nations Compensation Commission, Report and Recommendations made by the Panel of Commissioners concerning the Third Instalment of "E2" Claims, U.N. Doc. S/AC.26/1999/22, 9 December 1999, para. 100 ("Many claimants, particularly in the shipping industry, allege that they incurred *additional* staff costs, in the form of *overtime payments* and *bonus payments* made as incentives to employees so as to enable claimants to continue their operations in the Middle East area during the hostilities. ... The Panel finds that *additional* payments, where related to the compensable areas and periods ... are compensable to the extent that they were reasonable in amount.") (emphasis added).

merited.²²¹

5.15 Ordinary wages and other compensation that would have been paid in the absence of a wrongful act are therefore not compensable.²²² Accordingly, the UNCC F4 Panel rejected claims as to which there was insufficient evidence that personnel costs were extraordinary,²²³ on the basis that “salaries and related expenses paid to regular employees of a claimant are not compensable if such expenses would have been incurred regardless of Iraq’s invasion and occupation of Kuwait.”²²⁴

²²¹ See *Application of the Convention on the Prevention and Punishment of the Crime of Genocide*, para. 462 (rejecting a claim for monetary compensation when the evidence did not establish that the injury would not have occurred in the absence of the breach).

²²² See UNCC, Report and Recommendations on the Second Instalment of “F4” Claims, 3 October 2002, para. 30.

²²³ E.g., *Ibid.*, paras. 213–219, 240–248, 249–257; see also United Nations Compensation Commission, Report and Recommendations made by the Panel of Commissioners concerning the First Instalment of “F2” Claims, U.N. Doc. S/AC.26/1999/23 (“UNCC, Report and Recommendations on the First Instalment of “F2” Claims”), 9 December 1999, para. 101 (rejecting a claim on the same ground). The International Tribunal for the Law of the Sea reached the same result in the *M/V “Saiga”* case, when faced with a claim for compensation for “the expenses resulting from the time lost by [Saint Vincent and the Grenadines’] officials in dealing with the arrest and detention of the ship and its crew.” *M/V “Saiga” (No. 2) Case (Saint Vincent and the Grenadines v. Guinea)*, Judgment of 1 July 1999, ITLOS Reports 1999, para. 177. The Tribunal reject the claim, holding that any expenses incurred with respect to the officials were “incurred in the normal functions of a flag State” and for this reason were not compensable. *Ibid.*

²²⁴ UNCC, Report and Recommendations on the Second Instalment of “F4” Claims, 3 October 2002, para. 30; see also UNCC, Report and Recommendations on the Second Instalment of “F2” Claims, 7 December 2000, paras. 54, 57 (“The Panel finds that salary and overtime payments made to staff members who performed their regular tasks in assisting refugees are not, in principle, compensable where those payments would have been made regardless of Iraq’s invasion and occupation of Kuwait. ... [P]ayments made to staff members who performed their regular tasks in implementing emergency plans and other preventive and protective measures are not in principle compensable where those payments would have been made regardless of Iraq’s invasion and occupation of Kuwait.”).

5.16 This rule applies even when personnel are diverted from their other tasks to address the effects of a wrongful act. UNCC panels have thus routinely rejected claims for compensation for the ordinary wages of personnel, such as:

- the salaries and equipment of 1,700 regular staff police officers reassigned to provide protection to evacuees and additional services throughout the country;²²⁵
- the costs allegedly incurred by Kuwait University in creating a new research department to study the impacts of Iraq's invasion and occupation, where Kuwait failed to establish that the University hired new personnel to carry out the studies rather than simply reallocating resources from other departments;²²⁶
- the salaries of the crew of an oil pollution control vessel dispatched to assist with the response to oil spills in the Persian Gulf;²²⁷ and
- the salaries of regular government personnel dispatched to Bahrain and Qatar to provide technical assistance and training regarding the protection of drinking water from the effects of oil spills.²²⁸

²²⁵ UNCC, Report and Recommendations on the First Instalment of “F2” Claims, 9 December 1999, paras. 100(i), 101.

²²⁶ UNCC, Report and Recommendations on the Fifth Instalment of “F4” Claims, 30 June 2005, paras. 533–543.

²²⁷ UNCC, Report and Recommendations on the Second Instalment of “F4” Claims, 3 October 2002, para. 245.

²²⁸ *Ibid.*, para. 254. Accordingly, Costa Rica’s unsupported assertion that “claims were, in principle, permitted where staff or officials had been diverted from other functions which they

5.17 These rulings are corroborated by the sources cited in Costa Rica’s Memorial. In one, the panel awarded compensation only for *extraordinary* personnel costs, such as bonus and overtime payments, which the personnel would not otherwise have received.²²⁹ In the other, the panel limited compensation to “incremental salary and overtime payments … over and above normal salary and overtime payments....”²³⁰ Costa Rica cites no support for the proposition that regular personnel costs—even for reassigned personnel—are compensable.²³¹

would have performed” is incorrect. *See* CRMC, para. 2.17. On the contrary, the mere fact that personnel were reassigned from other work they would have done was *not* sufficient to make their salaries compensable, as demonstrated above. Only *additional* costs incurred with respect to reassigned personnel—such as overtime payments, deployment bonuses, or per diems which would not have been paid in the absence of the wrongful act—are compensable.

²²⁹ *See* CRMC, paras. 2.15, 2.21; *see also* UNCC, Report and Recommendations on the Fifth Instalment of “F4” Claims, 30 June 2005, paras. 258–259; UNCC, Report and Recommendations on the Second Instalment of “F2” Claims, 7 December 2000, paras. 55–57.

²³⁰ *See* CRMC, para. 2.16 (quoting UNCC, Report and Recommendations on the Second Instalment of “F2” Claims, 7 December 2000, para. 53).

²³¹ Costa Rica is not aided by its reliance on two investment arbitration awards. *See* CRMC, para. 2.18. As Costa Rica admits in footnote 36 of its Memorial, the *Pope & Talbot* tribunal held that the value of management time was *not* compensable because even though management was “involved in matters covered by the … claim,” the claimant incurred no additional cost because the managers’ “salaries would have been paid no matter what work related activities those managers undertook.” *Pope & Talbot Inc. v. The Government of Canada*, UNCITRAL, Award in Respect of Damages, 31 May 2002, para. 82. The “professional costs” cited by Costa Rica (*see* CRMC, para. 2.18), for which the tribunal did award compensation were legal and accounting fees, not salaries. *Pope & Talbot v. Canada*, paras. 85–87. In the *Lemire* case, the tribunal did not award damages for management time. Instead, the tribunal merely considered management time (which it did not quantify) to be relevant in estimating the amount invested by the claimant. *Joseph Charles Lemire v. Ukraine*, ICSID Case No. ARB/06/18, Award, March 28, 2011, para. 302. The tribunal did not use the amount invested as a measure of damages; to the contrary, it observed that “[i]nvestment and damages are of course separate concepts....” *Ibid.*, para. 300. Instead, it used the amount invested as a “test of reasonability” of the amount of damages determined through a discounted cash flow (DCF) valuation. *Ibid.*, paras. 298–299.

5.18 Here, Costa Rica did not incur any extraordinary expenses because it simply redeployed existing personnel from elsewhere in Costa Rica. This is made clear by the Witness Statement of Costa Rica’s former Minister of Public Security, who states:

[W]e were forced to *relocate* staff from many of its urban units in order to provide the necessary personnel to establish a presence in the area of Isla Portillos. Many of the *relocated* police were moved from units in the Central Valley, more specifically San José, Cartago, Heredia and Alajuela, but more generally resources were *relocated* almost from all police units across the country.²³²

5.19 Similarly, the former Minister’s Witness Statement refers to the “*relocation* of police personnel” and the need to “*reassign* police personnel from units in town and cities serving communities and individuals, and *relocate* them to Isla Portillos.”²³³ Further, in regard to the creation of a “special border police unit,” he states: “*For sake of clarity, this border police unit was formed by taking human and financial resources from other operational structures of the police.*”²³⁴ In other words, Costa Rica hired no new personnel and made no additional appropriations to fund the police who manned the posts for which Costa Rica claims compensation.

²³² Zamora Cordero Witness Statement (2017) (emphasis added). CRMC, Vol. I, Annex 5 (at p. 237).

²³³ *Ibid.*, p. 238 (emphasis added).

²³⁴ *Ibid.*, p. 239 (emphasis added).

5.20 Put simply, Costa Rica incurred no extraordinary expenses. Instead, it impermissibly seeks reimbursement for wages that it would have paid to its security personnel anyway.²³⁵

D. The Wages Allegedly Paid to Security Personnel Are Not Supported by Evidence

5.21 Costa Rica’s compensation claim for the wages it paid to its security personnel is further defeated by its failure to present evidence to substantiate its alleged expenditures. The only evidence it has presented for the more than \$3 million it claims for wages are the charts found at Annex 13, which come nowhere close to satisfying Costa Rica’s burden of proof.²³⁶

5.22 For wages allegedly paid during the period March 2011-September 2013, Costa Rica’s chart simply presents what it calls an “Estimation.”²³⁷ None of the underlying documentary evidence is produced. Moreover, the “Estimation”

²³⁵ Indeed, its compensation claim includes such ordinary expenses as “social security [contributions],” “Christmas bonus[es],” and “school allowance.” Costa Rica’s Ministry of Security, Department of Salaries and Wages, Report of Salaries paid to Police personnel from March 2011 to December 2015. CRMC, Vol. II, Annex 13 (at pp. 121–122). There is no support the Memorial’s claim that new personnel were hired. CRMC, para. 3.29(c). The only source that is cited, CRMC Annex 39, simply describes fluctuations in the total number of police employed by Costa Rica, which is unsurprisingly higher some years than others. No evidence is presented that would suggest that any increase in the number of police is attributable to the need to deploy forces to the two police posts for which Costa Rica claims compensation.

²³⁶ See *Diallo*, paras. 27, 31–33; UNCC, Report and Recommendations on the First Instalment of “F4” Claims, 22 June 2001, paras. 187–190, 232, 243–247, 381–382, 407–408, 716–717, 724, 727–728 (rejecting claims on similar grounds); Eritrea-Ethiopia Claims Commission, Final Award, Eritrea’s Damages Claims, 17 August 2009, paras. 108, 161, 174 (same).

²³⁷ Ministry of Security, Department of Salaries and Wages, Salaries Report (table titled “Estimation of Compensations Paid to Police Officers of the Public Force in Service”). CRCM, Vol. II, Annex 13 (at p. 122).

includes both police who were deployed to Agua Dulce and to Delta Costa Rica, even though the Memorial accepts that wages of personnel stationed at the latter post are not compensable, and there is no way to disaggregate the two.²³⁸

5.23 For the subsequent period, beginning in what is referred to as “II Sem 2013,” no fewer than 45 individuals are listed as being stationed at Delta Costa Rica.²³⁹ Further, the chart covers purported expenses through “I Sem 2016,” despite the fact that Costa Rica only claims reimbursement for wages incurred through the date of the Court’s Judgment of 16 December 2015.²⁴⁰ The limited information that Costa Rica has provided, and the opaque manner in which it has calculated its claim for wages, makes it impossible to disentangle the wages that Costa Rica accepts are not compensable from those for which reimbursement is sought.

II. Claims for Other Expenses Allegedly Incurred in Connection with Costa Rica’s Security Deployment

5.24 Costa Rica claims compensation for a variety of other expenses it allegedly incurred in relation to its police deployment. This includes \$29,459.40 for wages it allegedly paid to Coast Guard personnel who are said to have

²³⁸ *Ibid.*

²³⁹ *Ibid.*, pp. 124–126.

²⁴⁰ *Ibid.*

provided fluvial transport in connection with the police deployment.²⁴¹ It also includes the purchase of equipment allegedly used at its police posts, ranging from four ATVs (for which it seeks \$81,208.40)²⁴² to a plethora of miscellaneous items, including a blender, coffee-maker, washing machines, and office equipment (for which it seeks \$24,065.87).²⁴³

5.25 None of these claims is compensable because, as shown above (at paragraphs 5.3–5.13), they all relate to Costa Rica’s deployment of security forces to protect against an imagined threat of a Nicaraguan invasion of other parts of Costa Rica, not to prevent or remedy any of the material damage (that is, the felling of trees or the removal of underbrush in connection with the clearing of *caños*) caused by Nicaragua between October 2010 and January 2011, or, briefly, in September 2013.

5.26 None of these assorted claims is compensable in any event. The claim for wages of Coast Guard personnel is impermissible because Costa Rica hired no new personnel to transport its security forces, nor did it pay its existing personnel anything extra for their activities. It merely assigned existing personnel to perform the transport services at their normal wages. This, as shown above (at

²⁴¹ Specifically, Costa Rica seeks \$6,780.60 for October 2010–March 2011, and \$22,678.80 for March 2011–December 2015. CRMC, paras. 3.24(e), 3.29(d), and Tables 3.3 & 3.4.

²⁴² CRMC, p. 56, Table 3.3.

²⁴³ CRMC, para 3.29(b).

paragraphs 5.14–5.20), does not constitute an extraordinary expense and is not compensable.

5.27 Nor may Costa Rica seek compensation for the equipment that it says it provided to the security forces who were transported to Isla Portillos and Laguna Agua Dulce (the latter at some distance from the disputed area), for reasons other than remediation of the material damage caused by Nicaragua's works. How can Nicaragua's felling of trees and removal of underbrush be the proximate cause of Costa Rica's alleged purchases a washing machine, a blender, or office equipment, let alone four ATVs? The question itself reveals the absurdity of Costa Rica's claims.

5.28 In any event, nothing in the materials that Costa Rica has presented establishes an evidentiary basis for these claims. In particular, there is no evidence to substantiate the assertion that the Coast Guard personnel actually provided transport in connection with the police deployment.²⁴⁴ The evidence for the alleged purchase of equipment is equally deficient. Annex 14, which contains the putative documentation, does not provide dollar figures for each item listed, and Costa Rica does not disclose the exchange rate it used for its calculations. In

²⁴⁴ See National Coast Guard Service of Costa Rica, Department of Salaries and Wages, Report on working hours by personnel of the Coast Guard (21 October 2010 to 19 January 2015). CRMC, Vol. II, Annex 7; National Coast Guard Service of Costa Rica, Department of Salaries and Wages, Table of average Coast Guard Salaries (2010 to 2015). CRMC, Vol. II, Annex 8.

any event, the numbers do not add up, and it is impossible to determine which specific items of equipment are being claimed as compensable.²⁴⁵

A. Claims for Flights

5.29 Costa Rica claims compensation for various flights it allegedly carried out over the disputed area in October–November of 2010, and in April 2011, for which it collectively seeks \$56,696.4 in fuel and maintenance costs and \$2,062.37 for aircrew wages.²⁴⁶

5.30 Although Costa Rica claims that “[t]hese flights were necessary to verify reports of Nicaragua’s presence and unlawful activities on Costa Rican territory,²⁴⁷ and to “assess the environmental condition of the disputed territory,”²⁴⁸ the flight logs tell a different story. No fewer than 14 flights transported journalists, including from the *Tico Times*, *La Nación*, *Associated Press*, *Canal 44*, *Xinhua*, *Prensa Libre*, *Radio Nacional*, *Canal 13*, *Canal 7*,

²⁴⁵ See Costa Rica’s Ministry of Security, Border Police Directorate, Report of Expenses of Maintenance and Equipment of the Police Post in Agua Dulce Including Invoices, March 2016. CRMC, Vol. II, Annex 14. In addition, many of the items for which Costa Rica claims compensation were purchased between May and December 2015, that is, shortly before the Court’s Judgment, and more than two years after Nicaragua’s last wrongful acts. *Ibid.*

²⁴⁶ In particular, Costa Rica claims \$37,585.60 for fuel and maintenance and \$1,044.66 for aircraft crew for the October–November 2010 flights, and \$20,110.84 for aircraft fuel and maintenance and \$1,017.71 for aircraft crew for the April 2011 flights. CRMC, para. 3.24(a), Table 3.2 (at pp. 42–42); CRMC, para. 3.29(a), Table 3.3 (at pp. 55–57).

²⁴⁷ CRMC, para. 3.24(a).

²⁴⁸ *Ibid.*, para. 3.29(a).

*Canal 42, Extra, Costa Rica Hoy, Reuters, and Radio América.*²⁴⁹ Others ferried cargo, including “vegetable boxes” and “stretchers.”²⁵⁰ The logs for other flights leave blank the space for describing the “reason for the flight” and list no passengers, making it impossible to determine the flight’s relationship to Nicaragua’s acts.²⁵¹

5.31 Further, notwithstanding Costa Rica’s characterization of its claim as being for “fuel and maintenance,” its supporting materials reveal it actually includes insurance and unspecified “miscellaneous” costs.²⁵² Regardless, Costa Rica has not presented invoices or other documentation that substantiate its claims. Finally, Costa Rica is not entitled to compensation for the regular salaries of flight crews, which consisted of existing government personnel.²⁵³

B. Claims Relating to Alleged Environmental Monitoring

5.32 Costa Rica claims compensation for expenses allegedly incurred while monitoring environmental impacts in the disputed area. In particular, it

²⁴⁹ National Air Surveillance Service of Costa Rica, Department of Aeronautic Operations, Flight Logs, 14 April 2016. CRMC, Vol. II, Annex 12 (at pp. 71, 86, 87, 92, 93, 95, 96, 97, 99, 101, 105, 106, 107, 108).

²⁵⁰ E.g., *ibid.*, pp. 66, 70, 82, 83, 91.

²⁵¹ *Ibid.*, pp. 67, 72, 74, 77, 79, 84, 88).

²⁵² National Air Surveillance Service of Costa Rica, Department of Aeronautic Operations, Operative Expenses Report, 2 March 2016. CRMC, Vol. II, Annex 9 (at p. 45).

²⁵³ CRMC, para. 3.24(b). Further, the alleged salary costs are simply “estimated.” See National Air Surveillance Service of Costa Rica, Department of Salaries and Wages, Salaries Report (October 2010 to April 2011), (columns headed “Monthly average”). CRMC, Vol. II, Annex 10 (at pp. 53–56).

claims compensation for wages of personnel working for the Tortuguero Conservation Area (ACTo); food, water, and transportation costs; and expenses incurred in constructing a biological station near Laguna Los Portillos.²⁵⁴

5.33 To be compensable, environmental monitoring costs must, like any other expense, bear a direct and certain causal link to the activities the Court has held to be wrongful. As the UNCC has held, “compensation should not be awarded for monitoring and assessment activities that are purely theoretical or speculative, or which have only a tenuous link with damage resulting from” the wrongful acts.²⁵⁵

5.34 This requires proof that the monitoring is “reasonable” *vis-à-vis* the potential environmental impacts being studied.²⁵⁶ Costa Rica does not contest this, accepting that only “[c]osts *reasonably* incurred in monitoring” environmental impacts are compensable.²⁵⁷ A party seeking compensation must therefore prove that the monitoring project as a whole, as well as the particular expenses claimed for reimbursement, has the required causal nexus. At a minimum, this requires

²⁵⁴ See CRMC, paras. 3.24, 3.29.

²⁵⁵ UNCC, Report and Recommendations on the First Instalment of “F4” Claims, 22 June 2001, para. 31.

²⁵⁶ *Ibid.*, para. 29.

²⁵⁷ CRMC, para. 2.19 (emphasis added); *see also ibid.*, para. 2.13 (citing as “guidance as to the kinds of costs and expenses that would be recoverable” a decision by the UNCC Governing Council limited to “[r]easonable monitoring and assessment”).

evidence concerning the work's parameters and methodology; failure to present such evidence requires rejecting the claim.²⁵⁸

5.35 Costa Rica, however, has not presented any evidence of what was monitored, such as the monitors' terms-of-reference or instructions. Indeed, Costa Rica has not even presented reports that the monitors produced, even though they evidently exist. In that regard, the cover letter provided in Annex 6 indicates that ACTo furnished to Costa Rica's Ministry of Foreign Ministry two binders of documents that included "copies of logs, reports, [and] other documents, which provide evidence of the participation of government officials and ACTo teams in addressing the problems arising from the Nicaraguan invasion of Isla Calero."²⁵⁹ None of this material has been presented to the Court. It thus cannot be determined whether Costa Rica's monitoring was reasonably related to the activities that were found to be wrongful, or whether the monitoring (if it was carried out at all) was concerned with other issues, such as Nicaragua's dredging

²⁵⁸ See UNCC, Report and Recommendations on the First Instalment of "F4" Claims, 22 June 2001, para. 752 (rejecting a claim for monitoring and assessment costs where "Syria has failed to provide details regarding the proposed methodology and it has not indicated how the study would link sheep mortality to air pollution resulting from Iraq's invasion and occupation of Kuwait."); *ibid.*, para. 759 (rejecting a claim for monitoring and assessment costs where "Syria has not provided any details of the proposed methodology; nor has it indicated how the study would differentiate vegetation contaminated as a result of Iraq's invasion and occupation of Kuwait from that contaminated by other sources").

²⁵⁹ Tortuguero Conservation Area, National System of Conservation Areas, Report of expenses incurred in attending the situation arised by Nicaragua's occupation of Isla Calero ("Tortuguero Conservation Area, National System of Conservation Areas, Expenses Report"), 8 January 2016. CRMC, Vol. II, Annex 6 (at p. 5).

in the San Juan River, general ecological research, or issues related to the parties' land or maritime boundary disputes.²⁶⁰

5.36 Regardless, for the reasons explained above, the wages of the ACTo personnel (\$26,471.31) are not compensable because Costa Rica simply reassigned existing staff.²⁶¹ And Costa Rica has not provided sufficient evidence to substantiate the various other alleged "monitoring" expenses for which it claims reimbursement.²⁶²

²⁶⁰ In fact, the record shows that the monitoring related in large part to other issues. In a report to Ramsar, Costa Rica described the biological station as having objectives that are broader than monitoring linked to Nicaragua's activities. *See Costa Rican Ministry of Foreign Affairs, New Works in the Northeast Caribbean Wetland, Report for the Executive Secretariat of the Ramsar Convention on Wetlands*, July 2013, p. 7. CRMC, Vol. II, Annex 3 (at p. 184).

²⁶¹ CRMC, para. 3.29(g); UNCC, Report and Recommendations on the Second Instalment of "F4" Claims, 3 October 2002, pp. 31, 33, 36 (rejecting various claims for compensation for the wages of personnel involved in environmental clean-up and monitoring work because the claimant had not shown any extraordinary expenses).

²⁶² Tortuguero Conservation Area, National System of Conservation Areas, Expenses Report, 8 January 2016 (presenting only a summary table for its "Estimate of administrative costs" allegedly incurred for personnel, food, water transport, and ground transport). CRMC, Vol. II, Annex 6 (at p. 7); *ibid.* (providing only an "estimate of the cost of meals" made "indirectly using the rates authorized for the meal expense report approved by the Office of the National Comptroller General"); CRMC, para. 3.29(f) (failing to adequately justify expenditure of \$35,500 for a tractor it claims was needed "to carry out works in the area of the Biological Station for its maintenance and ensure access to it"); *ibid.*, 3.29(j) (failing to adequately justify expenditure of \$42,752.76 for purchasing two ATVs and three cargo trailers for the station, on the asserted ground that they were "dedicated initially to [the station's] construction, and later on to access and supply it, transporting materials, personnel and supplies from the post in Laguna de Agua Dulce to the Station").

C. Claims Relating to Satellite Imagery

5.37 Finally, Costa Rica seeks compensation for satellite images taken between December 2010-September 2015 (\$178,304.00),²⁶³ and for reports prepared by UNITAR and UNOSAT (\$43,143.00).²⁶⁴

5.38 Although Costa Rica claims these as monitoring costs, they are properly characterized as non-compensable litigation expenses since Costa Rica commissioned a substantial portion of them in connection with the presentation of its case on the merits, including especially its claim of sovereignty over the disputed area, and its unsuccessful claim of environmental harm resulting from Nicaragua's dredging of the San Juan River, and it relied upon them for those purposes.²⁶⁵

5.39 For example, Costa Rica's case on the merits relied heavily on the UNITAR and UNOSAT reports, which it annexed to the Memorial²⁶⁶ and cited as

²⁶³ Ministry of Foreign Affairs and Worship, Report and Invoices for expenses incurred by the Ministry of Foreign Affairs for the purchase of Satellite Images and geospatial data processing corresponding to the area of Isla Portillos and the Mouth of the San Juan River ("Ministry of Foreign Affairs, Report and Invoices") (1 December 2010 to 2 October 2015). CRMC, Vol. II, Annex 16 (at p. 183).

²⁶⁴ CRMC, p. 57; *see also ibid.*, p. 42.

²⁶⁵ See, e.g., UNITAR/UNOSAT, Morphological and Environmental Change Assessment: San Juan River Area (including Isla Portilllos and Calero), Costa Rica (Geneva, 2011), 4 January 2011 ("January 2011 UNITAR/UNOSAT Report"). CRM, Vol. IV, Annex 148; UNITAR/UNOSAT, Morphological and Environmental Change Assessment: San Juan River Area (including Isla Portilllos and Calero), Costa Rica (Geneva, 2011), 8 November 2011 ("November 2011 UNITAR/UNOSAT Report"). CRM, Vol. IV, Annex 150.

²⁶⁶ See January 2011 UNITAR/UNOSAT Report. CRM, Vol. IV, Annex 148; November 2011 UNITAR/UNOSAT Report. CRM, Vol. IV, Annex 150.

support for its arguments concerning whether the 2010 *caño* existed prior to its clearance,²⁶⁷ the alleged environmental impacts of those works,²⁶⁸ and Nicaragua's dredging of the San Juan River.²⁶⁹ Professor Thorne, Costa Rica's expert, similarly relied upon one such report for his own report that Costa Rica included with its Memorial.²⁷⁰

5.40 Costa Rica's arguments on the merits also used satellite images for which it now seeks reimbursement. Its compensation claim includes the image dated 7 June 2011 that was used in Sketch Map 5.1 of its Memorial.²⁷¹ One of the invoices it has presented includes an image taken on 28 August 2011 that appears to correspond to Figure I.42 in Professor Thorne's report.²⁷² And the invoice for the image taken on 22 December 2013 appears to match the one found in Figure 5.3 of Professor Thorne's report in the *Construction of a Road* case, which Costa Rica also used to cross-examine Nicaragua's experts.²⁷³ It is thus clear that the

²⁶⁷ E.g., CRM, para. 3.108, Figure 3.9 (at p. 125); *ibid.*, para 4.55.

²⁶⁸ E.g., *ibid.*, para. 3.111; *ibid.* para. 3.113.

²⁶⁹ E.g., *ibid.*, para. 5.108; *ibid.* para 5.115.

²⁷⁰ See, e.g., Thorne Report (2011), pp. I-34–I-36 (citing and reproducing an image from the January 2011 UNITAR/UNOSAT Report). CRM, Vol. I, Appendix 1 (at pp. 358–360); see also *ibid.*, Table II.1.

²⁷¹ Compare CRM, Sketch Map 5.1 (at p. 229) (including a satellite image dated 7 June 2011) with Ministry of Foreign Affairs, Report and Invoices (1 December 2010 to 2 October 2015). CRMC, Vol. II, Annex 16 (at p. 255) (invoice for a satellite image dated 7 June 2011).

²⁷² Compare Ministry of Foreign Affairs, Report and Invoices (1 December 2010 to 2 October 2015). CRMC, Vol. II, Annex 16 (at p. 254) (invoice for radar satellite imagery with a date range beginning on 28 August 2011) with Thorne Report (2011), Figure, I.42 (at p. I-72) (radar satellite image dated 28 August 2011). CRM, Vol. I, Appendix 1 (at p. 396).

²⁷³ Compare Report of Professor Colin Thorne, February 2015 (“Thorne Report (2015)”), Figure 5.3 (at p. 240) (image from Pleiades satellite dated December 2013, also used by Costa Rica in 20

primary purpose for Costa Rica’s commissioning of these materials was not for “monitoring,” but rather to further its claims and defenses on the merits. As such, they are non-compensable litigation expenses.

5.41 In any event, only a small fraction of the satellite images purchased by Costa Rica actually depict the three-square-kilometer disputed area; the vast majority covers *other* areas. Of the 26 sets of images for which Costa Rica seeks compensation, the smallest covers 15 sq. km.²⁷⁴ Only three cover less than 100 sq. km,²⁷⁵ and one covers more than 1100 sq. km.²⁷⁶

5.42 This defeats nearly all of Costa Rica’s compensation claim for satellite imagery because Costa Rica was charged by the square kilometer. For

April 2015 cross-examination of Nicaragua’s experts). CRR (*Construction of a Road* case), Appendix A with Ministry of Foreign Affairs, Report and Invoices (1 December 2010 to 2 October 2015). CRMC, Vol. II, Annex 16 (at p. 216) (invoice for image from Pleiades satellite covering area of Finca La Chorrera dated 22 December 2013). Costa Rica appears to be seeking reimbursement for additional satellite images that it used for its case on the merits. For example, one of Costa Rica’s invoices is for “December 2010” satellite imagery. *Ibid.*, p. 258. That description corresponds to several images, dated December 2010, which Costa Rica and Professor Thorne relied upon. *E.g.*, Thorne Report (2011), Figure I.18 (at p. I-27) (image dated 14 December 2010). CRM, Vol. I, Appendix 1 (at p. 351); *ibid.*, Figure I.42 (at p. I-72) (image dated 29 December 2010). Many of Costa Rica’s other invoices and images similarly overlap. Compare Ministry of Foreign Affairs, Report and Invoices (1 December 2010 to 2 October 2015). CRMC, Vol. II, Annex 16 (at p. 259) (invoice for “November 2010” satellite imagery) with Thorne Report (2011), Figure I.17 (at p. I-26) (satellite image dated 19 November 2010) CRM, Vol. I, Appendix 1 (at p. 350); compare Ministry of Foreign Affairs, Report and Invoices (1 December 2010 to 2 October 2015). CRMC, Vol. II, Annex 16 (at p. 225) (invoice for image from WorldView-2 satellite dated 27 July 2012) with Thorne Report (2015), Figure 5.3 (at p. 240) (satellite image dated July 2012 with reference code “WV02”) CRR (*Construction of a Road* case) Appendix A.

²⁷⁴ See Ministry of Foreign Affairs, Report and Invoices (1 December 2010 to 2 October 2015). CRMC, Vol. II, Annex 16 (at p. 183) (table provided by Costa Rica that summarizes the satellite imagery for which it is seeking compensation).

²⁷⁵ See *ibid.*, p. 183. Costa Rica has presented a total of 28 invoices; the area of the imagery purchased is not listed for two of them. *Ibid.*

²⁷⁶ *Ibid.*, pp. 227–228.

example, the invoice dated 5 May 2014 is for a set of images that “cover the area of the mouth of San Juan River and the delta of the San Juan River, along the northern border with Nicaragua,” that is, the entire stretch of the Lower Río San Juan.²⁷⁷ Costa Rica was charged \$28.00 per square kilometer for this 180 sq. km area,²⁷⁸ and claims compensation for the entire \$5,040 invoice.²⁷⁹ Costa Rica, however, has no right to obtain reimbursement for these images, or for its purchase of other imagery that depicts places other than the disputed area. None of these images bears any causal relationship to Nicaragua’s wrongful acts, which were confined to the disputed area.²⁸⁰

5.43 In sum, Costa Rica has failed to prove that it is entitled to compensation for any of its putative “monitoring” costs.

²⁷⁷ *Ibid.*, pp. 206–207.

²⁷⁸ *Ibid.*

²⁷⁹ *Ibid.*

²⁸⁰ See, e.g., *ibid.*, pp. 185–186 (invoice for images covering 227 sq. km. that “cover the Mouth of Río Colorado, Laguna Aguadulce Sector, Río Taura and Laguna Portillos”); *ibid.*, pp. 191–192 (invoice for images covering 318 sq. km. of which 230 sq. km. were billed, that “cover the area of Trinidad and the Mouth of San Juan River”); *ibid.*, pp. 203–204 (invoice for images covering 177 sq. km. that “cover the area from Delta Costa Rica up to the Mouth of San Juan River along the border with Nicaragua”); *ibid.*, p. 195 (separate images of “Delta of the San Juan River” and “Mouth of the San Juan River”); *ibid.*, p. 210 (separate images of “Delta Costa Rica” and “Mouth of San Juan River – Isla Portillos”); *ibid.*, p. 213 (separate images of “Delta Costa Rica” and “Mouth of San Juan River”); *ibid.*, p. 216 (separate images of “Mouth of San Juan River” and “Finca Las Mercedes, Finca La Chorrera, Linea Fonteriza (border)”; *ibid.*, pp. 219–220 (separate images of “Mouth of the San Juan River,” and “Delta Costa Rica,” and “Trinidad – Delta Costa Rica”). Some invoices contain no description of the area covered. E.g., *ibid.*, pp. 246–247, 249–50, 252, 254–55, 257. Others simply state that the images depict the “northern border with Nicaragua”, but based on their size clearly cover far more than the disputed territory. E.g., *ibid.*, pp. 225, 228, 232, 235, 237, 240.

SUBMISSIONS

For the reasons given herein, the Republic of Nicaragua requests the Court to adjudge and declare that the Republic of Costa Rica is not entitled to more than \$188,504 for material damages caused by Nicaragua's wrongful acts.

The Hague, 02 June 2017

Carlos J. Argüello-Gómez

Agent of the Republic of Nicaragua

CERTIFICATION

I have the honour to certify that this Counter-Memorial and the documents annexed are true copies and conform to the original documents and that the translations into English made by the Republic of Nicaragua are accurate translations.

The Hague, 02 June 2017

Carlos J. Argüello-Gómez
Agent of the Republic of Nicaragua

**CERTAIN ACTIVITIES CARRIED OUT BY NICARAGUA
IN THE BORDER AREA**

(COSTA RICA V. NICARAGUA)

**COUNTER-MEMORIAL OF THE REPUBLIC OF
NICARAGUA**

ON COMPENSATION

Annexes

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Annex 1

Cymie R. Payne & Robert E. Unsworth, Report on
Environmental Damage Valuation

26 May 2017

International Court of Justice

Case Concerning Certain Activities Carried Out by Nicaragua in the Border Area

Compensation

Costa Rica v. Nicaragua

Report on Environmental Damage Valuation

Professor Cymie R. Payne, J.D.,

Rutgers University

and

Robert E. Unsworth,

Industrial Economics, Incorporated

26 May 2017

EXECUTIVE SUMMARY

Costa Rica seeks USD 2,880,745.82 in compensation for environmental damage as one component of the compensation for material damages owed by Nicaragua. The damage claimed includes several ecosystem services: loss of standing timber, raw materials (fibre and energy), gas regulation/air quality, natural hazards mitigation, soil formation/erosion control, and habitat and nursery services.

International law, and many domestic legal regimes, recognize environmental damage as compensable. The UN Compensation Commission (UNCC), in particular, developed substantive and procedural approaches to assessing, verifying and valuing such claims. Claims for environmental damage, like Costa Rica's, are subject to the requirements of demonstrating actual loss that is causally related to the illegal act, and subject to the injured State's duty to mitigate the harm. Both restitution and compensation are appropriate means of reparation for environmental damage.

As the scope of compensable damage includes both resources that have an ascertainable market value and pure environmental damage, valuation methods for the latter have been developed. For its valuation of environmental services, Costa Rica uses an analysis performed by Fundacion Neotropica which applies an “ecological economics” approach to estimate monetary damages associated with Nicaragua’s construction of two caños and clearing of trees and vegetation in the Costa Rican territory on Isla Portillos. This approach involved the identification of six “ecosystem services” that were provided by the habitat at this site prior to Nicaragua’s actions. These six services are then valued using existing value estimates from past work and the ecological economics literature addressing values of services at other locations.

It is our opinion that the monetary valuation approach used by Neotropica is not consistent with accepted practice in the field of natural resource damage assessment, and that the damage estimate they generate using this method is not reliable or appropriate for assigning damages. Specifically,

- Services are valued which were not lost (e.g., soil formation and natural hazards mitigation).
- Capitalized value estimates are treated as annual values, and thus these values are counted multiple times over the analysis period (e.g., the value of the timber that was cut is included for each of the 50 years of the analysis).
- No recovery of services is assumed for 50 years.
- Values from the literature addressing very dissimilar circumstances are used to represent values in this case.
- Mistakes are made in how the stock values of environmental services are combined with flow values.

To provide a more reasonable measure of the monetary damage in this case, we estimate losses using the approach selected by Neotropica, correcting the errors contained in that analysis and its unsupportable assumptions. This results in a corrected “ecosystems services” valuation of USD 84,000.

We separately assess the environmental damage in question using a more appropriate monetization technique, which involves calculating the cost of conservation actions to off-set the harm as described by Costa Rica. Applying this approach, it is our opinion that the monetary value of harm in this case is on the order of USD 27,034 to USD 34,987, which reflects the funds required to support a 20- to 30-year replacement program based on the cost of purchasing conservation credits.

QUALIFICATIONS OF THE AUTHORS

Cymie Payne is Associate Professor at Rutgers University, The State University of New Jersey, where she teaches courses in environmental law, climate change law and international environmental law. Her areas of research focus on international law relating to environment and natural resources. She was a team leader and legal officer for the environmental claims program of the United Nations Compensation Commission in Geneva, Switzerland, throughout the claims review and for the Follow-up Programme for environmental awards. She has appeared as legal counsel on behalf of the International Union for Conservation of Nature (IUCN) before the International Tribunal for the Law of the Sea in its deep seabed mining and fisheries advisory opinion cases. Currently, she is legal advisor to the IUCN delegation to the preparatory committee for development of an international legally binding instrument under the UN Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction. She was Director of the Global Commons Project and Associate Director of University of California Berkeley's Center for Law, Energy and the Environment. She practiced natural resource and environmental law with the U.S. Department of the Interior and the law firm of Goodwin, Procter. She serves on the World Commission on Environmental Law of the IUCN, the International Law Association Committee on Sustainable Natural Resource Management for Development and is a former member of the American Society of International Law Executive Council. She holds a J.D. from University of California Berkeley School of Law and a M.A. from the Fletcher School of Law and Diplomacy.

Robert Unsworth, a Principal and Director with Cambridge, Massachusetts based Industrial Economics, Incorporated (IEc), is an internationally recognized expert in the field of natural resource economics and environmental damage assessment. His practice focuses on identifying appropriate methods for valuing environmental change in the context of complex environmental litigation, regulatory development, natural resource management, and public policy decision making. In his 32 years of experience he has addressed the full-range of issues encountered in natural resource damage assessment and subsequent environmental restoration. He has published on this topic in professional journals, including the seminal paper on Habitat Equivalency Analysis. He has served as an expert witness in cases involving claims for environmental damage caused by wildland fires, legacy hazardous waste releases, and illegal ecosystem alteration. He has authored guidance documents on best practices for natural resource and environmental valuation, including approaches for assessing damages to wetlands, forested ecosystems, and aquatic systems; indigenous community impacts; cultural and recreational resources; and groundwater.

Mr. Unsworth's experience relevant to this opinion includes assisting the United Nations Compensation Commission in the identification and review of available methods for valuing environmental damages

resulting from the 1990-1991 Gulf War. This effort included developing briefings for the Commission on available economic valuation and costing methods, including the strengths and weaknesses of these methods in the context of environmental claims. He served as an expert economist for State and Federal agencies acting as Natural Resource Trustees in negotiations with BP over damages resulting from the *Deepwater Horizon* oil spill. He was an expert reviewer of proposals and work product related to the development of methods for determining compensation for environmental harm under the European Union's Environmental Liability Directive. For the World Commission on Dams, he authored a report describing the potential uses of welfare economics for sound assessment of the environmental and social impacts of world-scale hydropower dam projects. He recently presented at an invited seminar on the Protection of the Environment in Relation to Armed Conflict, sponsored by the Permanent Missions to the United Nations of Sweden, Denmark, Finland, Iceland and Norway, in support of ongoing work of the United Nations International Law Commission.

Mr. Unsworth holds a Master of Forest Science degree from Yale University (focus on natural resource and environmental economics), and a Bachelor of Science *magna cum laude* in Forestry (focus on forest economics) from the State University of New York, College of Environmental Science and Forestry. He has lectured on the topic of environmental damage assessment at Tufts University, Yale University, Boston College Law School, and the University of Houston Law Center, and at numerous professional seminars.

Curricula vitae can be found in Appendix B.

I. INTRODUCTION

We have been asked to provide our expert opinion on the legal and technical aspects of assessing and valuing compensation for environmental damage resulting from construction of two *caños* and clearing of trees and vegetation in the Republic of Costa Rica (Costa Rica) by the Republic of Nicaragua (Nicaragua) in 2010 and 2013. We were also asked to assess whether the monetary valuation of damages contained in the report by Fundación Neotropica (Neotropica) for Costa Rica is consistent with accepted practice in the field of natural resource damage assessment, and whether the monetary damage estimate they present is reliable and appropriate for assigning damages. Finally, we were asked to provide our independent opinion of damages in this matter.

In developing this opinion, we reviewed the Neotropica Report,¹ various documents related to Costa Rica's claim,² published and unpublished authorities on international and international environmental law, and related environmental and ecological economics literature.

Below we first discuss the legal principles of environmental reparations and the economic standards and principles of sound environmental damage assessment. We then compare the approach taken by Neotropica against those standards and principles, provide a detailed review of the assumptions and calculations used by Neotropica, and present a corrected estimate of loss based on their approach. Finally, we provide our opinion as to a reasonable monetary measure of loss in this matter, based on standard environmental valuation methods.

II. LEGAL PRINCIPLES FOR ENVIRONMENTAL REPARATIONS

Evaluating a State's obligation to provide reparations for damage to natural resources requires application of the international law of reparations to the relatively novel subject matter of environmental harms. Providing compensation for environmental injury has become increasingly common. International bodies like the UN Compensation Commission (UNCC),³ regional entities like the European Union, and national legal systems

¹ Fundacion Neotrópica, Report on Monetary Valuation, 3 June 2016, Costa Rica Memorial, Vol I, Annex 1.

² Costa Rica Memorial, Vol. I and Vol. II. Kondolf, G. Mathias, 2012 Distributary Channels of the Río San Juan, Nicaragua and Costa Rica: Review of Reports by Thorne, UNITAR, Ramsar, MEET, and Araya-Montero Kondolf, G. Mathias, 2014. Erosion and Sediment Delivery to the Río San Juan from Route 1856.

³ The UN Compensation Commission was established by UN Security Council Resolution 687; it reviewed 168 claims for environmental losses caused by Iraq's illegal invasion and occupation of Kuwait 1990-1991. Of USD 85 billion claimed, the Commission awarded USD 5.3 billion for 109 successful claims. All environmental awards have been fully paid to the claimants. It has been said that "the Environmental Programme carried out with UNCC award funds and partly overseen by the UNCC may be the largest and most complex environmental cleanup project in human history."

including the 27 member states of the EU⁴ and the United States, provide remedies for both market and non-market environmental losses as urged by Stockholm Declaration Principle 22.⁵ The most extensive practice in this area is found in the work of the UNCC's environmental program and in U.S. natural resource damage remedies.⁶ The European Union's Environmental Liability Directive (ELD), based on the "polluter pays" and sustainable development principles, establishes minimum standards for environmental liability and compensation.⁷ The International Oil Pollution Compensation Funds operate somewhat differently.⁸ Those civil liability treaties, amongst the first, were created with a stronger emphasis on risk-spreading to facilitate the financial viability of maritime shipment of persistent oil while providing a measure of recovery for victims of oil spills that sometimes result.⁹

UNCC, Post-Conflict Environmental Restoration (2013) 3, available at uncc.ch.

⁴ European Commission, Report from the Commission to the Council and the European Parliament under Article 18(2) of Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage (2016) 2.

⁵ Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972. See also, Rio Declaration, Principle 13, Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I: Resolutions adopted by the Conference, resolution 1, annex I.

⁶ U.S. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. Sec. 9601 et seq.; U.S. Oil Pollution Act of 1990, 33 U.S.C. 2701 et seq.; Federal Register: The Daily Journal of the United States, Consumer Price Index Adjustments of Oil Pollution Act of 1990 Limits of Liability—Vessels, Deepwater Ports and Onshore Facilities, 80 Fed. Reg. 72342 (2015) (U.S. Oil Pollution Act is intended to deter incidents and breaches of law under the "polluter pays" principle).

⁷ EU Council Directive 2004/35/EC of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage, OJ L143/56 (2004), as amended by Council Directive 2006/21/EC, OJ L102, Council Directive 2009/31/EC, OJ L140, and Council Directive 2013/30/EU, OJ L170, Preamble (14), Article 2(1); hereinafter EU ELD.

⁸ International Convention on Civil Liability for Oil Pollution Damage, 1992; International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1992. The scope of this report does not allow for discussion of other international agreements that provide for environmental liability and compensation, such as the 2001 International Convention on Civil Liability for Bunker Oil Pollution Damage (Bunker Oil Convention), IMO document LEG/CONF.12/DC/1, or the 1963 Vienna Convention on Civil Liability for Nuclear Damage, 2 ILM (1963) 727 and its Protocol.

⁹ Having evolved from the 1969 International Convention on Civil Liability for Oil Pollution Damage, the Funds define compensable pollution damage to exclude pure environmental damage. 1992 Civil Liability Convention, Articles I(6), III. Inconsistent with current international decisions, this can also conflict with the national law of countries where incidents occur, as for example, when the French Cour de Cassation awarded €4.3 million for pure environmental damage as a result of the Erika oil spill. IOPC Funds, IOPC/APR13/3/3 – Incidents involving the IOPC Funds - 1992 Fund: Erika, sections 4.12, 5.2, 5.5 (2013), available at: <http://documentservices.iopcfunds.org/meeting-documents/download/docs/3688/lang/en/> See, Joe Nichols, Scope of Compensation for Environmental Damage under the 1992 Civil Liability Convention and the 1992 Fund Convention, in Marine Resource Damage Assessment, Liability and Compensation for Environmental Damage, 59–66 (F. Maes (ed.) Springer, 2005).

A. Assessment of environmental damage compensation

This section of the report will discuss the assessment of environmental damage compensation, drawing primarily on the UNCC practice.

Any environmental damage claim is subject to the requirements of demonstrating actual loss that is causally related to the illegal action. Sufficient evidence of the circumstances and amount of the damage or loss must support a claim for compensation of environmental loss.¹⁰ Given the context—international reparations in the aftermath of a major armed conflict—the UNCC took an active fact-finding approach by engaging its own expert consultants, which eased the burden on the claimants to some extent. Nonetheless, failure to provide sufficient evidence of the fact of damage, the extent of damage, the location of damage, the causal link to Iraq's illegal acts, and the value of damage were the most common reasons for the UNCC to deny or reduce the amount of an award.¹¹ The reductions, taken for various reasons including evidentiary gaps, were substantial: the total amount awarded, USD 5.3 billion, was about six percent of the total amount claimed, USD 85 billion.

Quantification of environmental damage is often challenging because it ideally requires both baseline measurements of the aspects of the environment that are subsequently harmed, and current measurements of conditions at the time of adjudication; the natural recovery that usually begins immediately after injury should be taken into account. This kind of information is frequently not readily available.¹²

As illustration of the kinds of information that are required, Iran sought USD 900 million for remediation of cultural heritage resources that it claimed had been damaged by pollution from the oil well fires in Kuwait, but the claim failed because, the UNCC report states, it did not “clearly describe or identify the nature and extent of the damage to the cultural heritage artefacts and sites that are the subject of the claim … Iran [did]

¹⁰ UNCC, Governing Council decision 10 (Provisional Rules), S/AC.26/1992/10 (2010) art. 35(3)(claims of governments “must be supported by documentary and other appropriate evidence sufficient to demonstrate the circumstances and amount of the claimed loss”); Governing Council Decision 7, S/AC.25/1991/7/Rev.1 (1991, rev. 1992), para. 37 (“Since these claims will be for substantial amounts, they must be supported by documentary and other appropriate evidence sufficient to demonstrate the circumstances and the amount of the claimed loss”); Governing Council Decision 46, S/AC.26/ 46 (1998). In U.S. law, “injury” is defined as “an observable or measurable adverse change in a natural resource or impairment of a natural resource service”, therefore evidence of such a change would be required to obtain a natural resource damage award. 15 C.F.R. §990.30, 43 C.F.R. §11.14(v).

¹¹ For example, UNCC F4 third instalment, paras. 38, 39.

¹² UNCC, Report and Recommendations made by the Panel of Commissioners Concerning the First Instalment of “F4” Claims, U.N. doc. S/AC.26/2001/16 (2001) para. 34, hereinafter, UNCC F4 first instalment.

not present[] sufficient evidence identifying the specific locations, materials, and the extent of contamination of the cultural heritage sites that it claims were damaged.”¹³

Claims for expenses incurred in relation to environmental losses remain subject to standard evidentiary requirements. Thus, the UNCC made no award for groundwater pollution monitoring studies because Kuwait did not provide documentary evidence for the costs, such as invoices and receipts, although the claims were otherwise sufficiently supported.¹⁴

Claims for compensation for environmental damage are also subject to the injured State’s duty to mitigate the harm. The UNCC environmental panel explained that the duty of injured states to mitigate environmental losses is “a necessary consequence of the common concern for the protection and conservation of the environment, and entails obligations towards the international community and future generations.”¹⁵ It found that “the failure of Kuwait to take the necessary measures in the face of a clear risk of damage [from improperly stored ordnance] was the direct cause of the resulting damage, and this broke the chain of causation so as to relieve Iraq of liability for the loss.”¹⁶ The UNCC also found that, in situations where a claimant faced multiple threats of severe environmental harm, exceeding its ability to address them all, the reasonableness of the measures taken must be assessed in the context of the circumstances.¹⁷

The International Law Commission’s Draft Articles on State Responsibility, Articles 34, 35, 36 and 37, indicate that, in order of preference, restitution, compensation, and satisfaction are to be provided for full reparation. The UNCC was structured to provide only financial compensation. However, in other environmental damage regimes, the responsible party is often not only allowed but required to undertake

¹³ UNCC, Report and recommendations made by the Panel of Commissioners concerning the fifth instalment of “F4” claims, S/AC.26/2005/10 (2005), paras. 204, 207, hereinafter UNCC F4 fifth instalment.

¹⁴ UNCC F4 first instalment, paras. 381-383.

¹⁵ UNCC, Report and recommendations made by the Panel of Commissioners concerning the third instalment of “F4” claims, UN Doc. S/AC.26/2003/31 (2003) para. 42, hereinafter, UNCC F4 third instalment. See also, UNCC Governing Council Decision 15, S/AC.26/1992/15 (1992) para. 9(d); Peter H. Sand, Environmental Principles Applied, in Gulf War Reparations and the UN Compensation Commission: Environmental Liability (CR Payne and PH Sand, eds. Oxford University Press 2011)186-187, hereinafter Payne & Sand; David D. Caron, The Profound Significance of the UNCC for the Environment, in Payne & Sand, 271-272.

¹⁶ UNCC, Report and recommendations made by the Panel of Commissioners concerning part one of the fourth instalment of “F4” claims, U.N. Doc. S/AC.26/2004/16 (2004) paras. 206 and 216 (Kuwait sought USD 653.8 million for the two claims, no award was made), hereinafter, UNCC F4 fourth instalment, part 1.

¹⁷ UNCC F4 third instalment, para. 43.

remediation activities itself.¹⁸ States could cooperate to the extent that restitution would be possible, where the responsible State would undertake environmental restoration activities in the injured State. This can be the most efficient and effective approach; frequently in the United States, natural resource damage cases are resolved through settlements that produce more environmental benefits at lower cost than a court judgment would have provided.

When the breach of an obligation results in harm to the environment, reparations may be owed for several aspects of the damage. Under UNCC Governing Council decision 7, paragraph 35, these included: response costs for abatement and prevention of environmental damage; monitoring and assessment of the damage undertaken for the purpose of “evaluating and abating the harm and restoring the environment”; reasonable measures already taken or future measures which can be documented as reasonably necessary to clean and restore the environment; public health monitoring; and depletion of or damage to natural resources.¹⁹

Similarly, the U.S. Oil Pollution Act provides compensation for the cost of: restoring, rehabilitating, replacing, or acquiring the equivalent of the damaged natural resources to return the resource to “baseline” condition;²⁰ the diminution in value of those natural resources pending restoration; plus the reasonable cost of assessing those damages.²¹

Comparable terms are used in the EU Liability Directive, which provides for remediation of the injured environment (primary remediation); and “complementary” and “compensatory” remediation for environmental losses when remediation has not fully restored the injury, sometimes called interim losses (secondary remediation), as well as “costs of assessing environmental damage, an imminent threat of such

¹⁸ “In line with the polluter-pays principle, the liable operator must take the necessary preventive or remedial action and must bear all costs. Damage is considered to be remedied once the environment has been returned to its pre-damage state.” European Commission, Report from the Commission to the Council and the European Parliament under Article 18(2) of Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage, COM/2016/0204 (2016) 2. *See also*, REMEDE, Deliverable No. 7: Assessment of Current Practice Regarding Environmental Liability in Member States (2007) Table 3.4.

¹⁹ UNCC, Governing Council decision 7, para. 35.

²⁰ Baseline is the condition of the resource before the injury. Although not derived from the *Factory at Chorzów* standard, this is consistent with it.

²¹ Oil Pollution Act, 33 USC 2706. The implementing regulations further define restoration as, “Any action . . . or combination of actions . . . to restore, rehabilitate, replace, or acquire the equivalent of injured natural resources and services. Restoration includes: (a) Primary restoration, which is any action, including natural recovery, that returns injured natural resources to baseline; and (b) Compensatory restoration, which is any action taken to compensate for interim losses of natural resources and services that occur from the date of the incident until recovery.” 15 C.F.R. §990.30.

damage, alternatives for action as well as the administrative, legal, and enforcement costs, the costs of data collection and other general costs, monitoring and supervision costs.”²² For the UNCC, these collectively constituted a remedy consistent with the ILC Draft Articles on State Responsibility and the reparation standard of the *Factory at Chorzów* case.²³

Examples from the UNCC illustrate these heads of damage: monitoring and assessment; primary remediation; and compensatory remediation. Among the 107 claims for the cost of monitoring and assessing “environmental damage, depletion of natural resources, monitoring of public health, and performing medical screenings” that the UNCC reviewed, the Kingdom of Saudi Arabia (Saudi Arabia) submitted several monitoring and assessment claims.²⁴ In one of these, Saudi Arabia—whose Persian Gulf coast was contaminated by the majority of the 6-12 million barrel oil spill from the conflict—sought compensation to monitor and assess the damage to its coastal and marine resources from the oil spills.²⁵ It received an award for a detailed shoreline study, which was promptly conducted; the study indicated that more than 600 kilometres of coastline had been contaminated by oil from the conflict and that this caused severe, persistent environmental damage to ecological function in the intertidal zone.²⁶

Based on this and other information, the UNCC made a finding that the harm did in fact result from the conflict²⁷ and awarded compensation to Saudi Arabia based on the cost of a primary remediation program to clean and restore its injured coastal environment.²⁸ The work was projected to take on the order of 25-40 years to restore the coastline, in part because the UNCC found that active remediation would cause further damage and natural recovery was ecologically more sound—the kind of situation that gives rise to interim

²² ELD, Article 2(16), Annex II(1); Ministry of the Environment, Finland, Remediation of Significant Environmental Damage Manual on Procedures (Helsinki, 2012) 55, hereinafter, Manual on Procedures, Finland.

²³ *Case Concerning the Factory at Chorzów, Germany v. Poland*, Permanent Court of International Justice, Series A, No. 17 (1928) 47; Commentary on articles 31 and 36 of the Draft Articles on State Responsibility for Internationally Wrongful Acts, in Report of the International Law Commission on the Work of its Fifty-third Session, UN GAOR, 56th Sess., Supp. No. 10, UN Doc. A/56/10 (2001).

²⁴ UNCC F4 first instalment, para. 3; Thomas H. Mensah, Foreword, in Payne & Sand, xviii-ix (“as a means for environmental protection and the basis on which such activities may legitimately be compensated”). Thomas Mensah was the chair of the Panel of Commissioners reviewing the environmental claims.

²⁵ UNCC F4 first instalment, para. 538.

²⁶ UNCC F4 third instalment, para. 172.

²⁷ UNCC F4 third instalment, paras. 176-8.

²⁸ UNCC F4 third instalment, paras. 184-186.

losses. Thus, Saudi Arabia also sought compensatory remediation, which included a project to create several shoreline reserves.²⁹ The UNCC agreed that the primary restoration for which compensation had been provided would not fully compensate the loss and that compensatory remediation was appropriate, stating:

... two shoreline preserves with a total area of 46.3 square kilometres and operated for a 30-year period, would sufficiently compensate for Saudi Arabia's losses in ecological services in its intertidal shorelines. The Panel considers that such preserves, sited in habitats similar to those that have been damaged, would provide ecological services similar in kind to those that were lost. In the view of the Panel, such preserves are feasible, cost-effective and pose a low risk of adverse impacts. The Panel also notes that these preserves would provide benefits to wildlife as well as offer compensation for the damage to subtidal habitats³⁰

The amount awarded was USD 46 million, a reduction from the USD 5.36 billion sought by Saudi Arabia, based on adjustments to certain costs, elimination of some costs due to lack of evidence, and “differences in the severity of oil contamination, losses in ecological services and expected recovery times in different areas,” a variability that Saudi Arabia had not fully taken account of.³¹

Some of the requirements that claimants need to satisfy are seen in other claims that Saudi Arabia made for compensatory remediation that received no awards. One, based on the loss of wildlife, was rejected for insufficient evidence.³² Another claim for ecological losses to shrimp and grouper fisheries from 1990 to 2001, based on lost catch figures and planned restocking projects, was rejected on the basis of insufficient evidence as well as inappropriate methodology.³³ Finally, a claim that proposed compensatory projects was rejected because it did not provide sufficient information to allow the UNCC to evaluate the technical merits of the programs, their relevance to specific losses, and their potential overlap with other projects proposed by Saudi Arabia.³⁴

²⁹ UNCC F4 fifth instalment, paras. 611.

³⁰ UNCC F4 fifth instalment, paras. 630, 632.

³¹ UNCC F4 fifth instalment, paras. 631, 633.

³² UNCC F4 fifth instalment, paras. 650-663.

³³ UNCC F4 fifth instalment, paras. 664-675.

³⁴ UNCC F4 fifth instalment, paras. 676-682.

As the UNCC examples just provided illustrate, compensable environmental damage may include harm to natural resources with readily ascertainable market values, such as timber or fish, as well as to non-marketed environment goods and services, such as intertidal habitat or carbon sequestration. The International Law Commission describes compensation as a financial transfer that can “cover any financially assessable damage.”³⁵ Some have argued that the loss of resources that are not traded in the market is not “financially assessable,”³⁶ and therefore there is no legal justification for compensating such losses. However, this ignores the International Law Commission’s further explanation that “the qualification ‘financially assessable’ is intended to exclude compensation for the affront or injury caused by a violation of rights not associated with actual damage to property or persons.”³⁷ That is, “financially assessable” is not intended to exclude losses to nonmarket resources, which are “actual damage.” The UNCC stated that “there is no justification for the contention that general international law precludes compensation for pure environmental damage.”³⁸

B. Valuation of non-market environmental damage

This section discusses methods for valuing non-market environmental damage, including those used by the UNCC.

The seeming novelty of claims for pure environmental damage stems from the extraordinary increase over the last 50 years in scientific understanding of how environmental systems—like the water cycle, biodiversity, soil formation, and the carbon cycle—function, and human society’s fundamental reliance on their integrity.³⁹ Because of this, the UNCC, the EU ELD, and other legal regimes are called to assess compensation for pure environmental damage. In doing so, the UNCC applied the *Chorzów* standard—that compensation should “re-establish the situation which would, in all probability, have existed if that act had not been committed”—in light of “the location of the damaged environment or resource and its actual or potential uses; the nature and

³⁵ ILC art. 36; Factory at Chorzów, 29.

³⁶ UNCC F4 fifth instalment, para. 46.

³⁷ ILC, “Draft articles on Responsibility of States” 99.

³⁸ UNCC F4 fifth instalment, para. 58. See also, ELD, preamble (14), which excludes from its scope the following: personal injury, damage to private property and to economic loss. Its scope of coverage is similar to other natural resource damage regimes, including damage to protected species and natural habitats, damage to water and damage to soil.

³⁹ See, e.g., Millennium Ecosystem Assessment, Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC. Available at: <http://www.millenniumassessment.org/documents/document.356.aspx.pdf>.

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extent of the damage; the possibility of future harm; the feasibility of the proposed remediation measures; and the need to avoid collateral damage during and after the implementation of the proposed measures.”⁴⁰ In particular, the UNCC emphasized “restoring the environment to preinvasion conditions, in terms of its overall ecological functioning rather than on the removal of specific contaminants or restoration of the environment to a particular physical condition.”⁴¹ A consequence of this was that for both Kuwait and Saudi Arabia, the UNCC refused to fund the expensive and environmentally damaging removal of oily residues on desert and coastal surfaces, although it meant that those places would remain visually sullied by the conflict for a considerable amount of time to come.⁴²

Another consideration particular to environmental claims is that they are usually handled as public claims where the government stands in the role of a trustee with fiduciary responsible for “a community interest in full remediation of the damage.”⁴³ The UNCC environmental panel described the environment as a common concern that “entails obligations towards the international community and future generations.”⁴⁴ The EU ELD states that interim losses do “not consist of financial compensation to members of the public,”

⁴⁰ UNCC F4 third instalment, para. 47.

⁴¹ UNCC F4 third instalment, para. 48.

⁴² UNCC F4 third instalment, paras. 126-129, 179-182.

⁴³ Sand, Environmental Principles Applied, in Payne & Sand 173-190; David D. Caron, The Place of the Environment in International Tribunals, in The Environmental Consequences of War: Legal, Economic and Scientific Perspectives 253, 256 (J. E. Austin & C. E. Bruch eds., Cambridge: Cambridge University Press 2000); David D. Caron, Finding Out What the Oceans Claim: The 1991 Gulf War, the Marine Environment, and the United Nations Compensation Commission, in Bringing New Law to Ocean Waters (David D. Caron and Harry N. Scheiber (eds), Nijhoff, Leiden 2004) 393, 394; UN Register of Damage, Rules and Regulations Governing the Registration of Claims, Article 11(1) (19 June 2009)(The UN Register of Damage, established in 2009, can receive claims in its public claims category for environmental damage resulting from the construction by Israel of its security wall); Agreement, Eri.-Eth., Dec. 12, 2000, 2138 U.N.T.S. 94, 40 I.L.M. 260 (Ethiopia claimed compensation for losses of gum Arabic and resin plants, and damage to terraces in the Tigray region for a value of approximately USD 1 billion and for loss of wildlife); UNCC Governing Council decision 7, S/AC.26/1991/7/Rev.1 (1992) (environmental damage claims to be reviewed as government claims); Cymie R. Payne, Developments in the Law of Environmental Reparations: A Case Study Of The UN Compensation Commission in Carsten Stahn, Jens Iverson, & Jennifer Easterday, eds. Environmental Protection and Transitions from Conflict to Peace: Clarifying Norms, Principles and Practices, (Oxford University Press forthcoming 2017).

⁴⁴ UNCC F4 third instalment, para. 42; Report and recommendations made by the Panel of Commissioners concerning the second instalment of “F4” claims, UN Doc. S/AC.26/2004/17 (2004) para. 38; and UNCC F4 fifth instalment, para. 40.

emphasizing the community nature of the loss.⁴⁵ Professor David Caron has characterized this relationship as a government acting “as an agent for the environment, for a community’s interest in that environment.”⁴⁶

A consequence of this is that international (UNCC), regional (EU), and domestic (US) legal systems require the claimant government to use financial compensation to restore the environmental damage for which it was awarded. The UNCC established two programs—the Monitoring & Assessment tracking program and the substantive claim Follow-up Programme—to ensure that compensation would be used for the projects for which it was awarded.⁴⁷ This is especially important where the loss is to services, like carbon sequestration, in which the international community as a whole has an interest. In 2013, after eight years of overseeing the Follow-up Programme, the UNCC Governing Council declared that Iran had completed its environmental projects and that Jordan, Kuwait and Saudi Arabia had satisfactorily put in place the necessary systems and controls, the final funds would be released, and the mandate of the Programme had been fulfilled.⁴⁸ Under the EU ELD, “compensatory remedial measures should provide natural resources and services of the same type, quality and quantity to compensate for interim losses.”⁴⁹

III. PRINCIPLES FOR ENVIRONMENTAL DAMAGE METHODOLOGY

Economists have long recognized that the natural environment can produce goods and services of value to humans,⁵⁰ and have developed a range of accepted approaches to measure these values.⁵¹ Environmental

⁴⁵ EU ELD, Annex II (1)(d).

⁴⁶ David D. Caron, The Profound Significance of the UNCC for the Environment, in Payne & Sand, 268. Caron ties this shift in perspective to an equivalent change from a government owning the claims of its citizens (and residents) to the UNCC approach where the government acted as an agent for the individual claimants. Reflecting the earlier practice, a British court found that the British government properly declined to pay a citizen money that it had received from the Chinese government “on account of debts due to British subjects”, stating that the relationship was not “the duty of an agent to a principal, or of a trustee to a cestui que trust.” *Rustomjee v The Queen*, II Q. B. D. 74 quoted in Marjorie M. Whiteman, *Damages in International Law*, vol. III (1943) 2051-2052.

⁴⁷ UNCC Governing Council Decision 132, S/AC.26/Dec.132 (2001); UNCC Governing Council Decision 258, S/AC.26/Dec.258 (2005); Cymie R. Payne, *Oversight of Environmental Awards and Regional Environmental Cooperation* in Payne & Sand.

⁴⁸ UNCC Governing Council Decision 270, S/AC.26/Dec.270 (2013) and UNCC Governing Council Decision 271, S/AC.26/Dec.271 (2013).

⁴⁹ Manual on Procedures, Finland, 61.

⁵⁰ Freeman, A. Myrick. 2003. *The Measurement of Environmental and Resource Values*. Resources for the Future, Washington, DC.

⁵¹ Freeman, A. Myrick, III, J. Herriges, and C. Kling. 2014. *The Measurement of Environmental and Resource Values: Theory and Methods*. 3rd Ed. Washington, DC: Resources for the Future. Champ, Patricia A., Kevin J. Boyle and

valuation may be performed to enhance the public's understanding of the role of environmental protection, for purposes of public policy setting (i.e., to balance the environmental costs of a policy or action against the expected benefits), or for environmental damages assessment (i.e., to assign values to be paid as damages for the environmental harm of an action or event).

The most common and well-accepted approach is to utilize market prices for environmental services that trade in reasonably competitive markets in the area being studied. For example, the expected price of a parcel of forestland can be used to estimate the potential economic value of forest products, over time, from the parcel (i.e., logs, fuel wood, etc.).⁵² In many cases, however, there are no market values that can be observed to assess the value of environmental services. In these cases, economists have developed “non-market” methods to assign values to environmental services. The value of some non-market services can be estimated using “revealed preference” techniques, which involve observing individuals’ behaviour when faced with choices. For example, while we cannot observe market prices for the aesthetic values provided by parkland to the general public, we can use information on how recreationalists choose between sites with differing aesthetic qualities to uncover the value of scenic beauty. In cases in which we cannot observe markets or behaviour, economists have used “stated preference” methods – surveys of the public – to elicit values for environmental goods and services. These surveys present respondents with hypothetical choices between states of the environment at varying cost. In addition, some environments provide us with services that would otherwise need to be provided by a built environment. The use of the implicit cost of providing environmental services is referred to in the literature as the “avoided cost” approach. For example, a coastal wetland may serve to process and absorb urban runoff. Absent this service, communities might need to construct costly water treatment facilities to address urban discharges.

In environmental damage contexts economists also use replacement costs, or restoration costs, to assign damages. For example, an oil spill may cause a wetland to die off, requiring efforts to replant the wetland to restore the services provided. While restoration costs are not values,⁵³ they can be used in some circumstances to understand the loss or gain experienced by the public given a change in the environment. Specifically, restoration costs are an acceptable measure of losses under certain conditions: the restoration

Thomas C. Brown (Eds.). 2003. A Primer on Nonmarket Valuation. Kluwer Academic Publishers; https://www.amazon.com/Nonmarket-Valuation-Economics-Non-Market-Resources/dp/9400771037/ref=sr_1_1?ie=UTF8&qid=1495630788&sr=8-1&keywords=A+Primer+of+Nonmarket+Valuation

⁵² Land prices generally reflect highest and best uses, and thus are most relevant for valuing environmental service flows in cases in which the good in question (i.e., forest products) is the highest and best use in the market being referenced. Of course, many environmental services are not reflected in markets.

⁵³ Consider that the cost of restoring some environments may simply be far more expensive than any value that was lost due to an impact, or far less expensive than the values that environments produce.

action will provide services similar to what was lost (in both quality and quantity); the restoration action should be technically feasible; the restoration action should be the least cost approach available to achieve the restoration objective; and the cost of the restoration action is not grossly disproportionate to the value of the services provided. This last factor is typically demonstrated by showing that the action has been taken by the public in similar contexts, or is required by law or policy (e.g., policies that require developers to undertake wetlands mitigation).

Restoration cost-based approaches are the most commonly applied approaches to assess environmental damages. This is due to two factors. First, values and methods may not exist to allow for assignment of economic values to an environmental harm, and economic valuation can be expensive and time consuming. Restoration costs are often easier and less costly to estimate. Second, many environmental statutes call for the use of recovered funds to be used for restoration and replacement of the injured environment. As such, it is expedient to consider the cost of such restoration.

While economists can undertake primary research to understand the value the public holds for an environmental good or service, it is sometimes possible to use existing values from the literature for valuation purposes. The use of existing values in a new situation is referred to in economics as “benefit transfer.” Benefit transfer has been used by environmental economists since the 1970s,⁵⁴ and standards for its application have been widely agreed upon.⁵⁵ These standards relate to assuring the quality of the underlying study, and the similarity of the good or service being valued. As stated in the US EPA’s guidance, there should be similarity in terms of the “(1) definition of the environmental commodity being valued (include scale and presence of substitutes); (2) baseline and extent of environmental changes; and (3) characteristics of affected populations.”⁵⁶

There are several key principles that define sound environmental damage valuation, no matter the approach taken. First, analyses should be clearly presented such that all assumptions and calculations are transparent and reproducible. Second, care should be taken to avoid double counting of benefit categories (e.g., if a replacement cost is used, the assessment should not also value future lost services for the same replaced

⁵⁴ Sorg and Loomis (1984). <http://revaluation.forestry.oregonstate.edu/brief-history>

⁵⁵ Johnston, R.J., J. Rolfe, R. Rosenberger, and R. Brouwer (Eds.). 2015. Benefit Transfer of Environmental and Resource Values: A Guide for Researchers and Practitioners. Springer; Office of Management and Budget (OMB). 2003. Circular A-4: To the Heads of Executive Agencies and Establishments. September 17; U.S. EPA. 2010. Guidelines for Preparing Economic Analyses. EPA 240-R-10-001. December.

⁵⁶ U.S. EPA. 2010. Guidelines for Preparing Economic Analyses. EPA 240-R-10-001. December. Pp.7-46.

resource). The baseline condition of the resource should also be considered (i.e., what services were provided by the resource in its baseline, or “but for” the event condition). Defining the baseline nature of a natural resource is particularly important in the application of benefit transfer, where similarity between the environments valued in the existing study and the case at hand is required for a sound transfer. Finally, in cases involving valuation of changes in environmental quality due to an event or action, the analysis should account for the likely recovery of the system over time.

While international law neither prescribes nor prohibits any particular valuation technique,⁵⁷ certain techniques may be considered best practice for valuing non-market natural resources. The UNCC most frequently used the estimated value of the cost of remediating and/or restoring the damaged resource. Saudi Arabia’s claim for coastal remediation, described above, is typical. One of the commissioners for the environmental claims program emphasized that,

First, claims for compensation must be well supported and may not be based solely on conjecture and speculation. To the extent scientific and technical experts are used to support the claims, the techniques and methodologies employed by the experts to support their conclusions must conform to generally accepted scientific principles. In addition, valuation methodologies used to quantify damages to natural resources must be reliable and must be based on the particular factual circumstances of the claim.⁵⁸

In some cases, the scale of appropriate restoration can be established using habitat equivalency analysis (HEA) or resource equivalency analysis (REA), techniques which allow for formal consideration of damages resulting from past harms, as well as consideration of environmental recovery times and the path or recovery of a resource following harm. These techniques allow analysts to determine the appropriate scale of restoration given the scale of harm.⁵⁹ Once the scale of appropriate restoration is known, it is then possible to assign monetary damages based on the associated costs of the restoration actions.

⁵⁷ UNCC F4 fifth instalment, para. 80.

⁵⁸ José Allen, Points of Law, in Payne & Sand, 168.

⁵⁹ Robert E. Unsworth & Richard C. Bishop, Assessing Natural Resource Damages Using Environmental Annuities, 11 Ecological Economics (1994); Huguenin, Donlan, Van Geel, and Paterson, Assessment and Valuation of Damage to the Environment in Payne & Sand, 78-79. UNCC F4 fifth instalment, paras 611-636.

The UNCC used HEA to evaluate the scale of intertidal zone losses in Saudi Arabia.⁶⁰ Jordan used HEA to calculate that damage to rangeland and wildlife reserves from vehicular traffic, overgrazing by refugees' livestock, and refugees' use of plants for fuel would require compensation of USD 2.4 billion.⁶¹ However, implementing the project as proposed would have required more land than was available in Jordan. The UNCC accepted the HEA approach in principle, and, in consideration of the limited land available, awarded USD 160.3 million. This amount reflected the costs of an alternative program in which rangeland users and managers would cooperatively manage the resource.⁶² These and other examples of HEA demonstrate a monetization procedure for environmental damages that can be used to compensate for lost environmental resources that are not traded in the market.⁶³

An alternative approach evaluates the loss of one or more specific ecosystem services. Iran used value transfer, one of the simplest forms of benefit transfer,⁶⁴ to quantify environmental loss, in one case multiplying an ecological service value for rangelands by the area of rangelands estimated to have been damaged by the presence of refugees, assuming the area lost all ecological services for one year.⁶⁵ No awards were made on the basis of that methodology, however. In the case of Iran's claim for rangeland service losses, as one of the commissioners recounted, "the Panel discarded Iran's theoretical computation of ecological

⁶⁰ See Section II.

⁶¹ UNCC F4 fifth instalment, paras 353-366, Annex I.

⁶² The amount awarded also reflected a reduction to account for "inadequacies in the information provided by Jordan and also the fact that Jordan failed to take steps to mitigate the damage, particularly by failing to reduce grazing pressure on the rangelands" UNCC F4 fifth instalment, paras. 362-363.

⁶³ See also, Kuwait's USD 194.1 million claim for the disruption of ecological services and human activities in desert areas. Kuwait sought compensatory remediation for desert areas damaged by tarcrete, windblown sand, dry oil lakes, wet oil lakes, oil-contaminated piles, oil-filled trenches, oil spills, military fortifications, and open detonation and open burning of ordnance. Ecological services that it claimed were harmed included soil stabilization, soil microcommunities, wildlife habitat, and vegetative diversity; human activities that were temporarily diminished included animal grazing and desert camping (a popular and culturally important form of recreation). Kuwait had received awards for the costs of assessing environmental damage from oil lakes that resulted from oil well fires and evaluating technology to remediate the damage. The UNCC also made award to Kuwait for cleaning and restoring terrestrial damage from oil wells, pipelines, trenches, mines, and other remnants of war. When it reached the compensatory remediation claims, the UNCC found Kuwait's use of HEA appropriate, but denied the claim because it found the losses were overstated and the remediation already provided for by other awards would be sufficient to address the losses. UNCC F4 fifth instalment, paras. 413-428.

⁶⁴ For "value transfers", a single value or average of values is drawn from one or more published studies. This is in contrast to benefit function transfer where a relationship is developed between the values in the literature and the attributes of the good being valued, and where that valuation function is then used to assign values to the case at hand.

⁶⁵ UNCC F4 fifth instalment, para. 175.

service losses for depleted rangelands as an overestimate, and instead applied alternative cost estimates based on commercial fodder prices.”⁶⁶

IV. ECONOMIC PRINCIPLES FOR COMPENSATION FOR ENVIRONMENTAL HARM

A. *The approach taken by Neotropica*

In attempting to place a monetary value on the environmental damages resulting from construction of two *caños* and clearing of trees and vegetation by Nicaragua in 2010 and 2013, Neotropica adopts an “ecosystem services” approach to classify the services provided by the study area, which involves listing all of the goods and services provided by the ecosystem prior to the 2010 and 2013 actions. In implementing this approach they use a “benefit transfer” framework, or the use of existing values from the literature and other cases, to assign damage estimates to a subset of services that they believe were diminished as a result of Nicaragua’s actions.⁶⁷

The Neotropica study categorizes ecosystem services according to a classification scheme first developed by the Millennium Ecosystem Assessment (MEA), dividing them into four groups: provisioning services; regulation services; supporting services; and cultural services. The MEA endeavoured to draw attention to the contributions of ecosystems to people’s well-being and motivate measurement of these contributions. With respect to these objectives, the MEA taxonomic scheme is well-suited. However, the economics literature has highlighted that it is an impractical framework where the focus is on *valuation* of ecosystem services.⁶⁸ In particular, the MEA classification scheme does not distinguish between ecosystem processes and functions with ecosystem service values or benefits. In particular, “supporting services” (such as soil formation and habitat and nursery) and some “regulating services” (such as air quality regulation) are ecosystem functions that contribute to the delivery of an ecosystem service but may be more appropriately thought of as “intermediates” or factors in the production function of an ecosystem service.⁶⁹ Conflating ecosystem

⁶⁶ Peter H. Sand, Environmental Principles Applied, in Payne & Sand, 182-183; UNCC F4 fifth instalment, para. 178. Other factors in the UNCC valuation of the claim were the lack of evidence supporting the extent of the damage and the likelihood that factors unrelated to Iraq’s invasion of Kuwait contributed to the damage. Id. 177.

⁶⁷ Neotropica states that their estimates are conservative (i.e., likely to underestimate actual losses) since not all of the services they considered were monetized. That said, they present no information that any of these services were in fact lost or are relevant for this case.

⁶⁸ Boyd and Banzhaf, 2007; La Notte et al., 2017.

⁶⁹ Boyd and Banzhaf, 2007.

functions and services is not just an issue of semantics, but leads to confusion regarding which endpoints should be valued to avoid double-counting.

Of the six ecosystem services monetized in the Neotropica report, four are categorized as regulating and supporting services. These services – gas regulation/air quality, natural hazards mitigation, soil formation/erosion control, and habitat and nursery – are all intermediates that contribute to, but are not themselves, the values that people derive from this site. Valuing these ecosystem functions separately and summing them with other categories (i.e., provision of timber and other raw materials) thus risks double counting of value.

Having identified relevant categories of ecosystem services, the Neotropica report then takes a simplified approach to estimate losses, valuing six categories of ecosystem services they believe were lost as a result of Nicaragua's actions. For each of these services they estimate a quantity of lost service, which is then multiplied by a monetary value to generate an annual loss, or “first year” damage estimate. This approach represents a highly-simplified application of benefit transfer. As noted above, while formal benefit transfer has been used by environmental economists since the 1970s and the requirements of sound transfers have been clearly defined in the published economics literature, the approach used by Neotropica is described as a “quick”⁷⁰ assessment approach requiring limited site specific data to place economic values to environment goods and services.

In defining approaches that are acceptable for assessing the monetary value of environmental harms, the EU developed a “toolkit” for member countries to use. This toolkit is intended to highlight best practices in environmental valuation, and notably does not include the “ecosystem services” approach used by Neotropica as an accepted methodology.⁷¹ Importantly, Costanza et al. (2014), which provides an update to the 1997 paper upon which Neotropica relies, does not include damage valuation as one of the applications

⁷⁰ “A valuation technique that gained popularity in the 90s is benefits transfer. It is a quick technique that became popular thanks to the work of Costanza et al. (1997) which has been disseminated in our hemisphere by the Gund Institute of Economics of the University of Vermont, USA, and the U.S. NGO Earth Economics, among others.” (page 24). As noted elsewhere in our report, benefit transfer is a method that pre-dated Costanza’s work.

⁷¹ Resource Equivalency Methods for Assessing Environmental Damage in the EU. July 2008. Deliverable 13: Toolkit for Performing Resource Equivalency Analysis to Assess and Scale Environmental Damage in the European Union. http://web.archive.org/web/20100602054339/http://www.envliability.eu:80/docs/D13MainToolkit_and_Annexes/REMEDE_D13_Toolkit_310708.pdf Further discussion of economic valuation techniques can be found in: Resource Equivalency Methods for Assessing Environmental Damage in the EU. July 2008. Deliverable 13: Annexes to the Toolkit. http://web.archive.org/web/20090617012240/http://www.envliability.eu:80/docs/D13MainToolkit_and_Annexes/D13_All%20Toolkit%20Annexes_July%202008.pdf

they claim this approach addresses. These authors instead highlight the role ecosystem service valuation can play in “heightening awareness and estimating the overall level of importance of ecosystem services.”⁷²

B. Transfer methods employed in the Neotropica study do not reflect sound economic principles

For four of the six categories of ecosystem services, Neotropica estimates values applying benefit transfer methods. As noted above, benefit transfer is the process of adapting existing value estimates to new circumstances. Economists commonly employ benefit transfer methods for economic valuation studies where time and resource constraints prevent primary research. Benefit transfer may involve the application of a single, mean, or median value from relevant studies (“unit transfer”), calibration of a benefit function from a single study (“function transfer”), or estimation of a benefit function from multiple studies (“meta-analytic transfer”). The Neotropica study uses a mix of valuation approaches: the simplest form of benefit transfer for some ecosystem services, market prices for others, and replacement cost estimate for others.⁷³

The accuracy and reliability of benefit transfer analyses depend critically on the similarity of the environmental and economic context between the original research and the transfer application, as well as the quality of the underlying study. Best practice guidelines for benefit transfer are discussed extensively in the resource economics literature and are prescribed, for example, in U.S. Office of Management and Budget and U.S. Environmental Protection Agency guidance documents for how to perform economic analysis.⁷⁴

The Neotropica study references the work of Costanza et al.⁷⁵ and studies developed by the U.S. NGO Earth Economics as the model for the benefit transfer conducted to value the lost wetland ecosystem services in the *Humedal Caribe Noreste*. This framework, and the Costanza et al. study in particular, has been widely criticized

⁷² Costanza et al. 2014. “Changes in the global value of ecosystem services”. *Global Environmental Change*. 26 (152–158, 153). ⁷² Costanza, et al., for example, explain that “valuation is about assessing trade-offs” and do not include loss valuation as a use of ecosystem service valuation. A comment on the UN Environment Programme’s TEEB also takes this position: “Because most valuation studies, including Costanza et al. (2014) do not assess the full range of ecosystem services, TEEB (2010) stressed that valuation is most useful for assessing the consequences of changes resulting from alternative management options, rather than estimating the system’s total value.” Katona, et al. *Navigating the Seascape of Ocean Management*, OpenChannels: Forum for Ocean Planning and Management (2017).

⁷³ As noted below, in some cases Neotropica confuses these approaches: the “value” used by Neotropica for natural hazard mitigation is actually a replacement cost (i.e., the cost to construct coastal defenses to replace a buffering ecosystem).

⁷⁴ U.S. Office of Management and Budget (OMB). Circular A-4: Regulatory Analysis. September 17, 2003.; U.S. Environmental Protection Agency, Guidelines for Preparing Economic Analyses, September 2000.

⁷⁵ Costanza, R., R. d'Arge, R. deGroot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R. V. O'Neill, J. Paruelo, R. G. Raskin, P. Sutton, and M. vandenBelt. 1997. "The value of the world's ecosystem services and natural capital." *Nature* 387:253–260.

and rejected by mainstream economics as inconsistent with sound economic principles and practices.⁷⁶ In general, these studies, sometimes referred to as “rapid assessments,” categorize land cover types (e.g., wetland, forest, and prairie) and identify categories of ecosystem services relevant to those types. Based on the available literature, the researchers then estimate values for each category of ecosystem service for each land cover type and sum across relevant ecosystem service values to calculate a per acre (or hectare) value (or value range) for each land cover type. Where relevant, these studies then sum values across the land cover types to estimate a value for a study area, which may be a watershed, a country, or in the case of Costanza et al. the entire earth. The recent Federal Resource Management and Ecosystem Services Guidebook⁷⁷ summarize the theoretical and practical issues associated with this approach:

“Many of the transfers applied in past ecosystem services literature (e.g., particularly in non-economics journals) and in ecosystem services valuation tools have applied methods that would be expected to generate large errors or invalid estimates, particularly due to incorrect aggregation of marginal values, failure to account for spatial connections between ecosystems and their human beneficiaries and their change over time, and other generalization errors.”⁷⁸

The Neotropica study refines this “rapid assessment” method somewhat by focusing on the ecosystem services of demonstrated relevance to the site injured habitats in question. However, the analysis falls prey to several common “rapid assessment” pitfalls. First, this approach ignores site-specific factors affecting the production of services by not accounting for variations in the ecological functioning, condition, or quality of the natural system being studied relative to the natural systems considered in the source studies. The Ramsar

⁷⁶ Bockstael, Nancy E., A. Freeman, III, R. J. Kopp, P.R. Portney, and V. Smith. 2000. “On Measuring Economic Values for Nature.” *Environmental Science & Technology* 34:1384-1389. In Secretariat of the Convention on Biological Diversity, (2007), An Exploration of Tools and Methodologies for Valuation of Biodiversity Resources and Functions, Technical Series no. 28, Montreal, Canada, the authors state “...the methodologies underlying these efforts, and the figures they produced, remain controversial; moreover, as the Millennium Ecosystem Assessment notes, their usefulness for policy purposes is limited, as it is rare for all ecosystem services to be completely lost and even then, such a complete loss would usually happen only over time.” (page 10).

Pearce, David. 1998. “Auditing the Earth.” *Environment* 40:23-28. Toman, Michael, 1998. “Special section: forum on valuation of ecosystem services: Why not to calculate the value of the world's ecosystem services and natural capital.” *Ecological Economics*. Elsevier, vol. 25(1), pages 57-60, April.

⁷⁷ National Ecosystem Services Partnership (NESP). 2016. *Federal Resource Management and Ecosystem Services Guidebook*. 2nd ed. Durham: National Ecosystem Services Partnership, Duke University, <https://nespguidebook.com>. NESP is an initiative of Duke University's Nicholas Institute for Environmental Policy Solutions and was developed with support from the U.S. Environmental Protection Agency.

⁷⁸ The Federal Resource Management and Ecosystem Services Guidebook is published by the National Ecosystem Services Partnership in the U.S. and included participation by more than 150 experts from U.S. federal agencies, universities, NGOs, and think tanks.

study referenced in the Neotropica report emphasizes the need to account for site-specific factors affecting ecological production functions when valuing wetland ecosystem services:

“Not all wetlands, however, perform all of these hydrological functions to the same extent, if at all. Indeed, some wetlands perform hydrological functions which may be contrary to human needs, such as riparian wetlands which may act as runoff generating areas, thus increasing flood risk downstream. It is therefore crucial to quantify the functions of a wetland before valuing it.”⁷⁹

The extent to which a given hectare of ecosystem delivers specific services also depends on its situation in the broader landscape. For example, a wetland downslope of cropland may provide a valuable service by filtering nitrogen runoff and decreasing the total amount of the nutrient reaching a water supply whereas a wetland surrounded by forest is unlikely to intercept such runoff to begin with and therefore would not provide this service. The Neotropica study does not explicitly compare the ecological functions of the wetland ecosystems in the source studies with the damaged wetland area in the *Humedal Caribe Noreste*, skipping a key analytic step required to produce defensible results from any benefit transfer exercise.

In addition, by relying on site-specific studies valuing these types of services in other areas (including some studies focused on sites as far as Thailand), the Neotropica study fails to account for the potential differences in values associated with differences in socioeconomic context between sites. For example, the value of natural hazards mitigation of mangrove wetlands in the study relied upon by Neotropica reflects the added cost of actions to replace the hazard mitigation service with an engineered break wall.⁸⁰ This value would be highly dependent on the scale and type of defence built, the period over which the hazard mitigation effort is needed, and even whether it would be undertaken at all in the context of the harm described in this case. In transferring values of ecosystem services from other studies, the Neotropica study does not appear to account for the ecological and socioeconomic context affecting these values. The TEEB report referenced by Neotropica, however, explicitly directs ecosystem service valuations to address local context:

“Many ecosystem service values, especially those relating to local benefits, are context specific. This reflects the natural environment’s sheer diversity and the fact that economic values are

⁷⁹ Barbier, Edward B., Mike Acreman, and Duncan Knowler. 1997. Economic Valuation of Wetlands: A Guide for Policy Makers and Planners. Ramsar Convention Bureau, Gland, Switzerland.

⁸⁰ Barbier, E.B. 2007. Valuing Ecosystem Services as Productive Inputs. *Economic Policy* 22(1): 177-229; Barbier, E.B., I. Strand and S. Sathirathai. 2002. Do Open Access Conditions Affect the Valuation of an Externality? Estimating the Welfare Effects of Mangrove-Fishery Linkages in Thailand. *Environmental and Resource Economics* 21(4): 343-367.

not a natural property of ecosystems but are integrally linked to the number of beneficiaries and the socio-economic context. The role of a coastal buffer zone to protect against extreme weather events can be vital or marginal, depending where you live. Water regulation is a lifeline in certain conditions, a useful back-up in others. Tourism is a major source of income in some areas, irrelevant in others, etc. This dependence on local conditions explains the variability of the values and implies that in general, the value of a service measured in one location can only be extrapolated to similar sites and contexts if suitable adjustments are made.”⁸¹

Furthermore, by estimating an equal value over time for a given service to all habitat hectares, regardless of the level of quality or functioning, the analysis does not provide information to support an analysis of incremental changes in ecosystem services. This is particularly important for ecological systems that will recover over time from harm. Recovery of an injured habitat will mean a gradual increase in the provision of particular services (e.g., for fibre and raw materials and gas regulation).⁸² It is unclear from the information presented in the Neotropica analysis whether this is taken into consideration, but the results presented reflects a binary presence or absence of the full per hectare value of these services at the site (i.e., no services for the next 50 years, and then the sudden return of services). As a result, the analysis does not reflect a valid accounting of ecosystem services at the site over time.

V. EVEN IF THE FRAMEWORK WERE CORRECT AND APPLICABLE TO ASSESS ENVIRONMENTAL DAMAGES, THE ANALYSIS PRESENTED IS FLAWED

As noted above, the “quick” benefit transfer approach utilized by Neotropica is not a generally accepted approach for environmental damage assessment, but instead is advocated for use in raising awareness of the importance of healthy environments. Leaving aside our significant concerns with use of this approach for purposes of environmental damage assessment, the analysis Neotropica conducts is severely flawed. In this section, we consider what the results would be had Neotropica correctly performed the analysis they set out to perform, using their selected methodology. Significant errors that we have identified are described below. Sufficient detail is not presented in Neotropica’s report to replicate some of the calculations done there, and there appear to be several errors in the numbers that are presented. As is shown, once corrections are made to the calculations and assumptions used by Neotropica, the resulting total damage value is only about three percent of that presented by Neotropica.

⁸¹ TEEB. February 2011. The Economics of Ecosystems and Biodiversity for National and International Policy Makers. <http://www.teebweb.org/publication/teeb-in-national-and-international-policy-making/>.

⁸² It is for this reason that Habitat and Resource Equivalency are used in many environmental damage claims, as discussed below.

Specifically, the Neotropica analysis is flawed in that:

- Services are valued which were not lost (e.g., soil formation and natural hazards mitigation).
- Capitalized value estimates are treated as annual values, and thus these values are counted multiple times over the analysis period (e.g., the value of the timber that was cut is included for each of the 50 years of the analysis).
- No recovery of services is assumed for 50 years.
- Values from the literature addressing very dissimilar circumstances are used to represent values in this case.
- Mistakes are made in how the stock values of environmental services are combined with flow values.

Given these flaws, the author's assertions that the resulting values are "conservative" (i.e., more likely to understate than overstate losses) are not supportable. Simply considering the scale of the damages calculated by Neotropica per hectare raises concerns. Specifically, a total area of approximately 6.2 hectares is claimed as disturbed to varying degrees by Nicaragua's actions. The total ecosystem service losses are estimated to be USD 2.8 million. This equates to losses of USD 455,340 per hectare, or USD 184,348 per acre. As discussed in this opinion below, the cost of purchasing ecosystem services credits in Costa Rica to offset any environmental harm caused by Nicaragua's actions would be more than an order-of-magnitude lower than these estimates.

Below we summarize the approach used by Neotropica for each category of service claimed as lost, and describe our specific concerns with the analysis performed and assumptions made. As noted, the approach they follow is largely a benefit transfer, with an assumed quantity of loss for each service category multiplied by a monetary value. The units used in the Neotropica report to describe the quantities of ecosystem services lost varies by service category (e.g., volume of standing timber, cubic meters of soil, hectares of habitat), and the monetary values used reflect various estimates drawn from the literature and past assessments. The six annual values for the six ecosystem services considered by Neotropica are summed to generate a total annual value. Finally, Neotropica assumes that these annual losses will occur each year for the next 50 years – effectively assuming no recovery of any of the monetized services for 50 years. Based on this time frame of assumed loss, they calculate a present value total loss estimate assuming a four percent discount rate.

Note that Neotropica provides several tables that present inputs to the analysis they perform, as well as summary tables of results. However, it is not possible to replicate the results they get given the information provided, and we found several instances in which there appear to be errors in the calculations.⁸³

In the calculations we perform below these errors have been corrected. Details on our assumptions and calculations are contained in Appendix A.

A. Standing stock of timber

As shown in Exhibit 1, Neotropica estimates the value of the standing stock of timber that was cut in C2010 and CE2013. This is done by multiplying the assumed stock of timber prior to actions taken at C2010 and CE2013 by a harvest factor, which reflects the author's assumption that 50 percent (half) of the standing stock of trees could have been harvested for sale absent Nicaragua's actions. Neotropica then multiplies this quantity of wood, expressed in cubic meters, by a price drawn from the Costa Rican market for the species found at the site.⁸⁴ They also assume that, in addition to harvesting 50 percent of the standing stock, it would have been possible to remove, sustainably, half of the annual growth of trees within the study area each year. This value is also multiplied by the same price. These two values are added together to yield a total annual value (or "first year damages"), adjusted to 2016 US dollars using a GDP deflator. Finally, a present value is calculated over the 50 year period of assumed harm. From these calculations Neotropica produces a damage value over the assumed 50 year period of USD 462,490.

In Exhibit 1 we provide the corrected calculations and damage estimate. Most importantly, the analysis mistakenly treats the monetary value of half the standing stock of trees that were removed in 2010 and 2013 as an annual value, when this value should be applied only once (at the time of the action), and summed with the present value of the annual growth rate.⁸⁵ That is, Neotropica estimates what the volume of standing timber (i.e., wood) was at the site prior to Nicaragua's actions. They then assume that half of that volume

⁸³ For example: with respect to gas regulation/air quality, it appears that Neotropica did not scale their estimated total loss to 2016 US dollars; with respect to natural hazards mitigation, it appears that Neotropica did not scale their estimated total loss to 2016 US dollars; and with respect to soil formation/erosion control, Neotropica's source document (*Colegio Federado de Ingenieros y Arquitectos de Costa Rica, 2007*) lists unit cost of soil as \$5.78, whereas Neotropica used a value of \$5.87.

⁸⁴ Natural resources often have both a "stock" and a "flow" component. The "stock" is the initial quality or level of a service (e.g., the volume of harvestable wood on a hectare of land, or the amount of carbon sequestered at a given moment in an ecosystem). The "flow" component is the addition expected each year to that stock. A mature ecosystem may still produce a flow of services, for example if managed to optimize timber production, or may be in steady-state.

⁸⁵ The analysis conducted by Neotropica is the equivalent of using a market value for a hectare of forest (purchased in fee interest) as the annual value of the timberland services provided by that forest, when it is in effect the present value of the flow of expected future services.

could have been harvested, and thus that it had a market value that was lost. Mistakenly, they then value that volume of standing stock as if it could have been harvested each year, when in fact it would only be available after the forest had regrown. In addition to considering the value of the standing stock, the Neotropica analysis assumes that these trees would continue to grow each year, and assign a market value to that additional volume of assumed growth. As shown in Exhibit 1, simply correcting for this factor reduces the present value 50-year loss estimate to USD 30,175, or about 6.5 percent of the Neotropica estimate.

Even this lower estimate may overstate damages. Specifically,

- It is not clear if the values used are stumpage values (reflecting the price paid for logs minus the harvest cost) or log prices. To the extent that these are harvested log prices, the values overstate the value of the standing timber.
- Even if the prices used are correct, no information is provided to support the notion that this area would have been sustainably harvested. Absent such evidence, including evidence of a market for the harvested product, the values presented will overstate the value of the standing timber. That is, these areas may not have a market value as commercial timberland.
- Since the site is recovering, and will presumably return to a forested state, it will in fact provide future timber services. Thus, the analysis developed by Neotropica may overstate the loss in annual growth (i.e., such growth might occur in the future despite the actions in 2010 and 2013). Removal of the loss of annual growth from the calculation above would reduce the damage estimate further.

Given these factors, the loss experienced by Costa Rica of standing timber services is no more than USD 30,175.

B. Other raw materials

The Neotropica analysis of the value of “other raw materials” that might be used for fibre and energy suffers from many of the same problems as the estimate of standing timber value. Specifically, Neotropica estimates the value of other raw materials as the product of an assumed value per hectare times the number of disturbed hectares, which is then adjusted to 2016 US dollars using the GDP deflator. From this value they calculate a present value loss of USD 17,877. Note that we were unable to replicate the “first year” value they report on Table 14, but accept the value as reported for purposes of this discussion.

In Exhibit 1 we provide the corrected results. As with the standing stock of timber, Neotropica takes the estimate of the stock value of raw materials (per hectare) harmed at the site, and calculates a present value. However, this volume could not be removed each year for 50 years, and the initial harm caused by Neotropica would be expected to recover over time. As such, the annual value of USD 1,200 should be used to represent

the present value of this service flow, or about seven percent of the value presented in Neotropica's Table 14 for this ecosystem service.

While this reflects the corrected present value loss, we have other concerns.

- Three studies are referenced from the literature as providing estimates of the per hectare value of “other raw materials,” which are averaged together in the calculations. These values range from USD 2.02 to USD 467.94 per hectare, or over more than two orders-of-magnitude. As such, using the lowest value would result in a valuation only about one percent as large as the value presented. Using the higher value would result in a more than doubling of the result. In such instances – that is, when the literature values are not consistent – it is appropriate to select the value from the study of greatest relevance to the valuation problem and site being studied. That step was not taken by Neotropica.
- No support is presented in the Neotropica report that there would have been any local use of the cut vegetation for purposes of fibre or fuel. Absent such use, the correct valuation measure for this category of ecosystem service would be zero.
- No attempt is made by Neotropica to model the timing of the recovery of this service flow across the site. Instead, it is assumed that the services are lost for 50 years. It is likely this vegetation will recover well before 50 years. For this reason, and given that all of the vegetation at the site was valued in the first year, we believe there is no basis for assuming a future loss in services after the first year.

C. Gas regulation

The Neotropica report considers the loss in “gas regulation” services from the site. This represents the loss in carbon sequestration services resulting from the cutting of vegetation at C2010 and CE2013. As discussed by the International Panel on Climate Change,⁸⁶

“Terrestrial ecosystems provide an active mechanism (photosynthesis) for biological removal of CO₂ from the atmosphere. They act as reservoirs of photosynthetically-fixed C by storing it in various forms in plant tissues, in dead organic material, and in soils. Terrestrial ecosystems also provide a flow of harvestable products that not only contain carbon but also compete in the market place with fossil fuels, and with other materials for construction (such as cement), and for other purposes (such as plastics) that also have implications for the global carbon

⁸⁶ Intergovernmental Panel on Climate Change. Third Assessment Report. 2001. 4.2 Land Use, Land-Use Change, and Carbon Cycling in Terrestrial Ecosystems. <http://www.ipcc.ch/ipccreports/tar/wg3/index.php?idp=158>

Annex 1

cycle. The global carbon cycle consists of the various stocks of carbon in the earth system and the flows of carbon between these stocks.

In assessing the role an ecosystem plays in the removal and storage of carbon, it is important to properly describe the role of the ecosystem in terms of storing a “stock” of carbon versus the role in further sequestration of carbon (the “flow”). The International Union for the Conservation of Nature provides useful definitions:⁸⁷

Stocks: The term terrestrial carbon stock is the sum of the carbon stocks, or pools, of all terrestrial ecosystems. The carbon pool of each ecosystem is determined by multiple elements – elements such as the carbon in vegetation, in soil, in leaf litter, and in woody debris.

Flows: Carbon flows, or fluxes, refer to the annual exchanges of carbon between one system, such as the atmosphere, and another, such as the biosphere. Like stocks, flows will differ by the structure of each ecosystem. Typically, carbon exchange accounting includes photosynthesis, the accumulation of carbon in vegetation, soil and litter (assimilation), the decomposition of this matter, as well as the production of gaseous carbon such as CO₂ (respiration), and emissions produced by disturbances, such as from deforestation and fire. These flows will change periodically depending on anthropogenic land uses and natural cycles.

To generate a present value estimate Neotropica multiplies the number of impacted hectares by a literature-based value for the carbon storage potential (expressed in dollars) for a hectare of habitat. No detail is provided to allow the reader to understand how similar the habitat was in this case (prior to disturbance) versus the habitat considered in the literature from which the value is drawn. The value used to establish a monetary damage estimate is USD 14,995 per hectare, to which Neotropica adds USD 26.83, which reflect the annual value of sequestered carbon per hectare. They then convert this value to 2016 US dollars using a GDP deflator, and calculate the present value over 50 years. This yields a present value loss estimate for this category of service of about USD 937,509.

The corrected damage estimate is presented in Exhibit 1. Most significantly, the value of the stock of carbon at the site prior to clearing at C2010 and CE2013 should not be applied each year for 50 years, nor should the annual increment be added to this value. The correct result, using the Neotropica value, is USD 47,778 (the value from the literature used by Neotropica, but correctly interpreted as a stock value), or about five percent of Neotropica’s present value estimate.

⁸⁷ International Union for the Conservation of Nature. 2009. The Terrestrial Carbon Budget: Stocks and Flows. Draft report. https://www.iucn.org/sites/dev/files/import/downloads/terrestrial_carbon_stocks_and_flows.pdf

Estimates of the value of loss in sequestration services on a particular vegetated parcel of land can be complicated to develop and highly site specific. This is due to the complexities of measuring the stock of carbon sequestered at the site prior to the event in question, considerations of whether the injured site was continuing to sequester carbon (or was a mature area in steady state), the expected future land use of the site, and the growth rate of the site after the event, among other factors. For example, given that these harmed sites are experiencing re-growth, carbon sequestration services have returned at the site and may outpace the lost services moving forward.

There is no need to add to this stock value the value of annual future sequestration, as is done in the Neotropica analysis. First, there is no evidence that the harmed sites are not in fact sequestering carbon; that is, as the habitat recovers from the harm and the vegetation on the site grows, it will once again sequester carbon, possibly at a rate greater than prior to Nicaragua's actions. Second, the timber and raw materials damage calculations described above assume harvest of these products to get the economic benefit that is claimed as lost. If such a harvest took place, the carbon would no longer be sequestered. By including both of these services there is obvious double counting of damages – either the trees remain in place, providing a sequestration service, or are harvested, terminating that service. The analysis should not assume both services were possible off the same land area.⁸⁸

The value of carbon sequestration used in this analysis is intended to reflect the marginal avoided cost of damage associated with climate change. That is, if we are able to sequester—or avoid the release of—CO₂, it is assumed that the effects of climate change will be mitigated. This value is referred to as the social cost of carbon, the value of which has been estimated by various governmental and non-governmental agencies. This value reflects the value of avoided impacts *to the world's population*, not simply the avoided costs to citizens of Costa Rica, and could be interpreted as overstating damages to Costa Rica.

⁸⁸ As noted earlier, one of the concerns with the ecosystem services approach is whether the assumed services can in fact be provided in combination, or if some services (e.g., coastal protection) are lost when other services (timber harvest) take place.

D. Soil formation/ erosion control

Neotropica presents a value for what they say are lost soil formation and erosion control services. They estimate this value by multiplying the volume of “removed” soil by a price to replace the soil, drawn from cost estimates for another site.⁸⁹ They then apply this value to estimate what they view as the cost over 50 years, adjusted using the GDP deflator.⁹⁰ Using these values, Neotropica creates what they refer to as an annual damage estimate of USD 54,926, for a present value over the 50 year period of approximately USD 1,180,000.

Neotropica implicitly assumes that soil displaced at the affected sites is “lost” from the site, when in fact the soil was simply redistributed.⁹¹ Moreover, the caños have since re-filled with sediment. As such, no actions are needed to replace the soil formation / erosion control service. For this reason we believe the corrected value should be zero, and that this category of loss should not be included in the damage claim being made by Costa Rica.

Even the service had been lost, the corrected application of Neotropica’s approach would be to recognize that the USD 54,926 value should not be used to create a present value; it is the cost of replacing all of the soil displaced at the site, which would only need to occur once, resulting in a corrected present value of about 5 percent of that reported by Neotropica).

E. Natural hazard mitigation

Neotropica defines “natural hazard mitigation” to include the services provided by an ecosystem that mitigate risk and natural hazards, such as storms and other adverse weather conditions. That is, natural systems can either serve as a buffer between human communities and the effects of storm events (i.e., coastal flooding) or serve as a sink for excess surface water in the event of a storm.

⁸⁹ The case that they draw information from involved a mined area, which differs in both detail and scale from the case at hand.

⁹⁰ As noted, the authors report a value of \$5.87/cubic meter which should be \$5.78/cubic meter.

⁹¹ Costa Rica’s 2011 report to Ramsar (i.e., Annex 155 to Costa Rica’s Memorial on the Merits and source number 6 in Neotrópica’s Table 2) states (referring to the 2010 Caño) “the materials extracted during the construction of the [2010] caño were dumped on both banks of the excavated waterway.” (CRM Annex 155, pp. 32-33) In its March 2014 report to Ramsar (Source number 12 in Neotrópica’s Table 2), Costa Rica reported that a December 2013 site visit to the eastern (2013) caño had revealed “[d]redge soil excavated from [the] channel and piled up along the bank.” (Costa Rican March 2014 Report to Ramsar, CR-1 to May 2014 Compliance Report, p. 11 Figure 4).

There is no evidence presented that this service has been lost in this case, and thus we conclude that this category of loss should not be included in the damage claim being made by Costa Rica. That is, there is no information presented by Neotropica that the physical alterations made by Nicaragua, as subsequently remediated by Costa Rica, will lead to an increase in the risk of coastal flooding posed to nearby communities and infrastructure in the event of a storm event. In addition, the change in the physical landscape in this case – on the order of several hectares – is not comparable to the changes considered in the study on which Neotropica depends for monetary valuation (thousands of hectares of lost coastal mangrove).

Neotropica states that their analysis of the natural hazard mitigation services lost at this site relied on values from a study by Barbier et al (2002)⁹² – however, that citation is unrelated to this issue. It is possible they are referring to Barbier (2007),⁹³ which is also cited. That study uses what is referred to as a “replacement cost” approach to ecosystem valuation (what we referred to above as “avoided cost”). That is, he considers the cost of constructing breakwaters and barriers along the coast to infer the value of mangrove as a natural shoreline buffer. As such, the Neotropica study mischaracterizes the values presented as “avoided cost in the destruction of infrastructure and properties,” since the value is in fact the cost of shoreline protection. From this value they create a present value damage estimate of approximately USD 126,700, covering both the C2010 and CE2013 areas.

The purpose of the Barbier study was to provide information for decision makers considering actions to protect coastal mangrove in Thailand, by allowing them to describe the benefits of such systems. However, the values presented are replacement cost estimates specific to the coastline being studied, not economic values held by the public for such protection. The Thailand case study considers a situation in which there is regional and widespread loss of mangrove (described as 3.4 km² per year), that was expected to lead to increased vulnerability to storms. For the C2010 and CE2013 sites, there is no need described to create such coastal barriers, no evidence that such a cost would be justified by the hazard mitigation achieved, and no indication that such protection would be called for over the 50 years of the analysis. As such, we do not believe this ecosystem service should be included in the final damage estimate.⁹⁴

⁹² Barbier, E.B., I. Strand and S. Sathirathai. 2002. Do Open Access Conditions Affect the Valuation of an Externality? Estimating the Welfare Effects of Mangrove-Fishery Linkages in Thailand. Environmental and Resource Economics 21(4): 343-367.

⁹³ Barbier, E.B. 2007. Valuing Ecosystem Services as Productive Inputs. Economic Policy 22(1): 177-229.

⁹⁴ We were unable to identify the source of the hazard mitigation unit value used in the Neotropica report, and thus were unable to determine if the analysis correctly calculates the present value damage.

F. Habitat and nursery

The Neotropica study describes the loss of “habitat and nursery services” and values those services using an average of values drawn from the published literature. Specifically, they average four habitat service estimates purportedly drawn from three published studies (see Appendix 3 of the Neotropica Report). The values cited by Neotropica as reported in the literature cover a very large range – USD 2.02 /hectare to USD 4,432/hectare – all of which are presented as being annual values. The average of these values is then adjusted to 2016 US dollars using a GDP deflator, and a present value is calculated over the 50 years of assumed harm. The result is a damage estimate of USD 40,731 for this category of ecosystem services.

Since the average used by Neotropica is dominated by the high end estimates purported to be from Barbier et al. (2002),⁹⁵ we reviewed that source and the related Barbier (2002).⁹⁶ In Barbier (2002) the author estimates habitat and nursery services for mangrove in Thailand to be on the order of USD 55/hectare (page 205). In Barbier et al. 2002 the authors estimate these services for the same Thailand habitat to be approximately USD4 to USD 136/hectare (or an average of USD70 hectare), present value (page 358). We were unable to find the values used by Neotropica in either Barbier report. In any case, we believe these to be present values, but even treating them as annual estimates would reduce the Neotropica estimate from a present value of USD40,731 to a present value of approximately USD1,342 (page 358). That is, accepting the Neotropica approach, the correct value would be no more than 13 percent of the Neotropica estimate.

Finally, we have serious concerns with transferring a study performed for policy purposes in Thailand – with differing ecological, economic and cultural attributes – to this case. Most significantly, the Thai analysis considered the widespread and permanent loss of coastal mangrove habitat, not the interim loss of habitat pending recovery. As such, we believe that even the adjusted value presented in Exhibit 1 will overstate actual losses in habitat services in this case.

G. Valuation using Neotropica’s methodology but correcting its errors

In sum, correcting for Neotropica’s errors, as described above, and omitting ecosystem services not relevant to this site and the harm at issue in this matter, we estimate a present value loss of no more than USD 84,296, which is approximately three percent of the Neotropica estimate. In our opinion, this value reflects the correct application of the approach Neotropica uses.

⁹⁵ Barbier, E.B., I. Strand and S. Sathirathai. 2002. Do Open Access Conditions Affect the Valuation of an Externality? Estimating the Welfare Effects of Mangrove-Fishery Linkages in Thailand. Environmental and Resource Economics 21(4): 343-367.

⁹⁶ Barbier, E.B. 2007. Valuing Ecosystem Services as Productive Inputs. Economic Policy 22(1): 177-229.

Exhibit 1: Original and Corrected Values Using Ecosystem Good or Service	Year of Initial Harm	Neotropica: Present Value over 50 years (2016 USD)	Corrected Analysis: Estimate of Present Value Damages (2016 USD)	Correction Made
Standing Timber	2010	\$420,162	\$27,248	Corrected to One-Time Value
	2013	\$42,327	\$2,927	
	Total	\$462,490	\$30,175	
Raw materials (fibre and energy)	2010	\$17,058	\$1,121	Corrected to One-Time Value
	2013	\$819	\$79	
	Total	\$17,877	\$1,200	
Gas regulation/air quality	2010	\$797,827	\$41,050	Corrected to One-Time Value
	2013	\$139,682	\$6,728	
	Total	\$937,509	\$47,778	
Natural hazards mitigation	2010	\$157,080	\$0	Not relevant to injured area
	2013	\$27,501	\$0	
	Total	\$184,581	\$0	
Habitat and nursery (biodiversity)	2010	\$34,662	\$4,384	Adjusted Present Value
	2013	\$6,069	\$760	
	Total	\$40,730	\$5,144	
Soil formation/erosion control	2010	\$722,031	\$0	Not relevant to injured area
	2013	\$457,893	\$0	
	Total	\$1,179,924	\$0	
Total	2010	\$2,148,821	\$73,803	
	2013	\$674,291	\$10,494	
	Total	\$2,823,112	\$84,296	

VI. MONETIZING ENVIRONMENTAL DAMAGE USING STANDARD TECHNIQUES

As described above, the standard approach in natural resource damage assessment is to value damage claims using restoration or replacement costs. In our view, such an approach is appropriate for valuing Costa Rica's claims for environmental damage, and it would provide an accurate measure of loss that does not suffer from the weaknesses inherent in Neotropica's approach.

The largest environmental damage claims before the UNCC used this approach.⁹⁷ Damage to Saudi Arabia's coastal environment, discussed in Section II.A. above, was addressed by a combination of restoration costs and replacement costs. The restoration costs were valued by the cost of a remediation plan tailored to the injured sites in Saudi Arabia, using accepted restoration techniques that were expected to avoid unacceptable risks of adverse environmental impacts from the remediation itself.⁹⁸ The replacement costs were valued by the cost of shoreline reserves that would provide additional ecological services to replace those that were lost.⁹⁹

It is common in the context of natural resource damage assessment for parties to use payments to land conservation banks, such as wetland banks, or to pay landowners to conserve or protect habitat as a means to offset environmental harms. This is a favoured approach because these actions assure that the same level of environmental services are available as would have been but for the harm in question. Relevant to this case, Costa Rica has an active market that pays landowners and communities for the management of habitat to provide ecosystem services.¹⁰⁰ The price paid for such agreements generally are set at a level that compensates landowners and communities for the lost economic value of the land when placed into conservation status while allowing some activities to continue in a sustainable manner. The International Institute for Environment and Development (UK) lists prices paid to private entities to conserve, manage, and enhance parcels of land to provide ecosystem services. As reported in that document, the highest price

⁹⁷ They included, in addition to the claim of Saudi Arabia discussed here (claim no. 5000451), Kuwait's claim for areas damaged by oil contamination in the form of oil lakes, oil-contaminated piles, oil trenches, oil spills from pipelines, physically disturbed by the construction and subsequent backfilling of oil trenches by Iraqi forces and by the construction of pipelines by Iraqi forces to transfer oil to fill those trenches UNCC F4 fourth instalment, part II, paras. 73-79, 89-102 (claim no. 5000454, award for this portion of the claim USD 1.97 billion; in para. 93, the Panel said that "remediation should be focused on the restoration of ecological functions, particularly in terms of regulating site stability, infiltration processes, and nutrient cycling.") and UNCC F4 fifth instalment, paras. 411-475 (claim no. 5000460 for loss of various natural resources).

⁹⁸ UNCC F4 third instalment, paras. 181-187.

⁹⁹ UNCC F4 fifth instalment, paras. 620-622, 630-636.

¹⁰⁰ Porras, I., Barton, D.N., Miranda, M. and Chacón-Cascante, A. (2013). Learning from 20 years of Payments for Ecosystem Services in Costa Rica. International Institute for Environment and Development, London.

paid for ecosystem services by Costa Rica in 2012 was USD 294/hectare/year (page 16). Placed in 2017 dollars (using the GDP price deflator) this price would be USD 309/hectare/year. Assuming a 20- to 30-year payment requirement for the 6.19 hectares that were injured (i.e., that recovery progresses at the harmed site, and thus the replacement is only needed until the site recovers),¹⁰¹ this would imply an ecosystem service replacement cost of USD 1,913/year, or a present value for 20- to 30- years of USD 27,034 to USD 34,987 (which reflects the funds required to support a 20 to 30 year replacement program, assuming a four percent real discount rate on future costs).

It is important to note that the range of cost estimates presented above is several orders-of-magnitude lower than the damages claimed by Costa Rica, reflecting both the overstatement of damages in the Neotropica report, as well as the availability of efficient markets for ecosystem credits.

¹⁰¹ As noted above, there is little evidence presented by Neotropica that the harm being addressed will persist for 50 years, or that the harm would not decline with time. As such, we pick a more reasonable time period for this replacement cost estimate.

APPENDIX A**DETAILED CALCULATIONS**

Ecosystem good or service	Year of Initial Harm	Corrected Analysis: Estimate of Present Value Damages (2016 USD)	Formula	Explanatory Notes
Standing Timber	2013	\$27,247.87	(2.48 hectares*50% harvest rate*211 cubic m loss per hectare*\$64.65 unit cost)+(21.482 PV adjustment factor*2.48 hectares*50% harvest rate*6 cubic m/year growth rate*\$64.65 unit cost)	Present value loss: For the eliminated stock of standing timber, the number of hectares lost was multiplied by the cubic meters of loss per hectare, a one-time harvest rate, and unit cost per hectare.

Ecosystem good or service	Year of Initial Harm	Corrected Analysis: Estimate of Present Value Damages (2016 USD)	Formula	Explanatory Notes
	2010		$(.43 \text{ hectares} * 50\% \text{ harvest rate} * 211 \text{ cubic m loss per hectare} * \$40.05 \text{ unit cost}) + (21.482 \text{ PV adjustment factor} * .43 \text{ hectares} * 50\% \text{ harvest rate} * 6 \text{ cubic m/year growth rate} * \$40.05 \text{ unit cost})$	<p>The value of eliminated stock was added to the present value of timber growing in subsequent years. The present value of growth was calculated as the product of the PV adjustment factor, hectares, harvest rate, growth rate, and unit cost.</p> <p>The unit cost was derived from Neotropical's calculations, which averaged the price of standing timber per cubic meter for several inventoried tree species.</p>
Raw materials (fibre and energy)	2013	\$1,120.50	5.76 hectares * \$175.76 unit cost * 1.1068 GDP scaling factor	One-time loss: The unit cost per hectare was multiplied by the number of

Ecosystem good or service	Year of Initial Harm	Corrected Analysis: Estimate of Present Value Damages (2016 USD)	Formula	Explanatory Notes
	2010	\$79.07	0.43 hectares*\$175.76 unit cost*1.0462 GDP scaling factor	hectares lost, then scaled damages by year of initial harm (2013 or 2010) to 2016 US dollars. The unit cost per hectare was derived from Neotropica's calculations, which averaged \$2.02, \$292.45, and the average of \$109.66 and \$4432.19, raw material values derived from literature.
Gas regulation/air quality	2013	\$41,050.16	2.48 hectares*\$14955 unit cost*1.1068 GDP scaling factor	One-time loss: The unit cost per hectare was multiplied by the number of hectares lost, then damages were scaled by the year of initial harm (2013 or 2010) to 2016 US dollars. The unit cost per hectare was derived from Neotropica's calculations, which took the sum of \$14955.23 (stock value) and \$26.83 (flow value, the average of \$15.56 and \$38.10).
	2010	\$6,727.59	0.43 hectares*\$14955 unit cost*1.0462 GDP scaling factor	
	2013	\$0.00	N/A	

Ecosystem good or service	Year of Initial Harm	Corrected Analysis: Estimate of Present Value Damages (2016 USD)	Formula	Explanatory Notes
Natural hazards mitigation	2010	\$0.00	N/A	Not relevant to injured area; natural hazards mitigation was therefore excluded from this analysis.
Habitat and nursery (biodiversity)	2013	\$4,384.30	2.48 hectares**\$62.50 unit cost*1.3167 GDP scaling factor*21.482 PV adjustment factor	Present value loss: The 21.482 PV adjustment factor was multiplied by the number of hectares lost, unit cost per hectare, and GDP scaling factor (to scale 2002 unit cost to 2016 US dollars). The unit cost per hectare was derived from Barbier 2002, as cited by Neotropica.
Soil formation/erosion control	2010	\$760.18	0.43 hectares**\$62.50 unit cost*1.3167 GDP scaling factor*21.482 PV adjustment factor	Not relevant to injured area; soil formation/erosion control was therefore excluded from this analysis.
Additional Inputs				
Input	Value	Formula	Explanatory Note	

Annex 1

Ecosystem good or service	Year of Initial Harm	Corrected Analysis: Estimate of Present Value Damages (2016 USD)	Formula	Explanatory Notes
PV Adjustment Factor	21.48218462	$(1 - 1.04^{-50}) / 0.04$	Present value of an annuity: The current value of a set of cash flows in the future, given a 50-year time period and a 4% discount rate	

APPENDIX B

CURRICULA VITAE

ROBERT E. UNSWORTH**PRINCIPAL AND DIRECTOR****Overview**

Mr. Unsworth is a recognized expert in the field of natural resource economics and damage assessment. His consulting practice focuses on identifying appropriate methods for valuing environmental change in the context of complex environmental litigation, regulatory development, natural resource management, and public policy decision making. In his 32 years of experience he has addressed the full-range of issues encountered in natural resource damage assessment and subsequent environmental restoration.

Education

Yale University. Master of Forest Science (focus on natural resource and environmental economics). 1986.

State University of New York, College of Environmental Science and Forestry. Bachelor of Science *magna cum laude* in Forestry (focus on forest economics). 1984.

Summary of Experience

Mr. Unsworth is recognized as a leader in the field of **Natural Resource Damage Assessment (NRDA)**. He has worked on over 100 assessments at sites throughout the US and the Caribbean, including playing a leading role in several of the most visible and complex assessments conducted to-date. His work has been for both plaintiffs and defendants involved in environmental damage claims. Examples of his work in this field include:

- **U.S. DEPARTMENT OF JUSTICE.** Serving as an expert witness in cases involving claims for environmental damage caused by wildland fire and legacy hazardous waste releases. Work includes affirmative presentation of damage claims, as well as review and critique of damage claims brought against the United States. Testimony has addressed forested ecosystems, wetlands, groundwater, and lost human use of natural resources.
- **UNITED NATIONS COMPENSATION COMMISSION.** Assisted in the identification and review of available methods for valuing environmental damages resulting from the 1990-1991 Gulf War. This effort included developing briefings for the Commission on available economic valuation and costing methods, and the strengths and weaknesses of these methods in the context of environmental claims.
- **CALIFORNIA ENERGY COMMISSION.** Developed guidance on the use of economics in assessing the ecological benefits of reductions in once-through cooling at power plans. Testified before the Commission on sound approaches to such assessments.
- **STATE AND FEDERAL TRUSTEES FOR NATURAL RESOURCES INJURED BY THE BP DEEPWATER OIL SPILL.** Participated as an expert economist in negotiations with BP over funding of early restoration projects to restore lost human use of the Gulf of Mexico environment.
- **U.S. FEDERAL TRUSTEES FOR RESOURCES INJURED BY THE EXXON VALDEZ OIL SPILL.** Managed the assessment of economic damages resulting from the *Exxon Valdez* oil spill. Assisted in the preparation and analysis of results from a nationwide contingent valuation survey designed to estimate changes in the passive-use value of Prince William Sound as a result of this oil spill.
- **VARIOUS U.S. CLIENTS.** Served as an expert on water valuation in the context of litigated cross-boundary water use conflicts and natural resource damage assessments. Analyses included integrating complex hydrological and biological models with economic valuation tools to yield defensible measures of resource value, and critiquing opposing experts models of water valuation.

- **EUROPEAN COMMISSION.** Served as an expert reviewer of proposals and work product related to the development of methods for determining compensation for environmental harm under the European Union's Environmental Liability Directive.
- **U.S. STATE AND FEDERAL CLIENTS.** Authored guidance documents on best practices for natural resource and environmental valuation, including approaches for assessing damages to wetlands and other aquatic systems, indigenous community impacts, cultural resources, and groundwater. Authored the first published paper on habitat equivalency analysis, which has become the most widely used techniques for environmental damage assessment. Mr. Unsworth is often called upon to speak on the topic of environmental damage assessment, to both technical audiences and legal professionals.
- **VARIOUS U.S. TRIBAL GOVERNMENTS.** Provide expert guidance on methods for assessing the economic and cultural impacts of environmental change in over two dozen tribal (indigenous) communities. Related to this work, for the U.S. Department of the Interior, developed guidance on the use of economics in indigenous community damage claims.

Other relevant work includes:

- **ELECTRIC POWER RESEARCH INSTITUTE.** Led a series of studies of the effect of climate change on the U.S. economy, including the agricultural, forest products, water resources, recreational, and commercial fishing sectors.
- **VARIOUS U.S. FEDERAL AGENCIES.** Developed guidance documents on the use of economics to value environmental changes resulting from oil pipeline releases, injuries to National Park resources, and environmental changes associated with air pollution.
- **WORLD COMMISSION ON DAMS (SOUTH AFRICA).** Developed a report describing the potential uses of welfare economics in the assessment of the environmental and social impacts of hydropower dam projects.
- **UGANDA'S MINISTRY OF WATER AND ENVIRONMENT.** Participated in an assessment of the contribution of water resources development and environmental management to Uganda's economy. Specific role was the identification of methods for placing values on forested ecosystems and wetland ecosystems potentially impacted by changes in land use and water management.
- **UNITED NATIONS (NEW YORK)** Presented at seminar on the Protection of the Environment in Relation to Armed Conflict, sponsored by the Permanent Missions to the United Nations of Sweden, Denmark, Finland, Iceland and Norway, in support of ongoing work of the United Nations International Law Commission.

Leadership

In addition to his consulting practice, he currently serves as a Principal and Director of Industrial Economics, Incorporated (IEC). From 2005 to 2011 he served as IEC's President, responsible for strategic planning as well as day-to-day operations. In addition to his professional responsibilities, he serves as Vice-Chair of the Board of Directors of the Student Conservation Association, a 60-year old organization dedicated to the development of environmental conservation skills in young people of all backgrounds. He is also member of the Board of Directors of the Yale Alumni Service Corps, and has worked with this organization to serve communities in Ghana and India.

Selected Publications and Presentations

Bishop, Richard and Robert Unsworth, 1994, "Assessing Natural Resource Damages Using Environmental Annuities," *Ecological Economics* 11:35-41.

Mendelsohn, Robert, Daniel Hellerstein, Michael Huguenin, Richard Brazee, and R. Unsworth, 1992, "Measuring Hazardous Waste Damages with Panel Models," *Journal of Environmental Economics and Management* 22:259-271.

Environmental Performance of Tanker Designs in Collision and Grounding: Method for Comparison. Committee for Evaluation Double-Hull Tanker Design Alternatives, Marine Board, Transportation Research Board, National Academies. Washington, DC. 2001.

Equivalency Methods in Natural Resource Damage Assessment. Law Seminars International, Natural Resource Damages. Newark, NJ, November 12-13, 2009

Factors Trustees Consider in Selecting Damage Assessment Approaches. Fourth Annual Advanced Conference on Natural Resource Damages, Law Seminars International. Santa Fe, NM, July 15-16, 2010.

Identifying and Accounting for Cultural Use of Natural Resources in the NRDAR Process, Economic and Other Methodologies. State and Tribal Government Working Group, 2011 Natural Resource Damage Assessment and Restoration Workgroup. Albuquerque, NM, February 15-16, 2011.

Assessment of Lost Cultural Use in the NRDAR Process. U.S. Department of the Interior, Annual NRDA Restoration Workshop, Tribal Session. Phoenix, AZ, March 28, 2011.

An Introduction to Tribal Natural Resource Damage Claims. Wth Dr. Gerald (Taiaiake) Alfred, for the Law Seminars International Conference on Natural Resource Damages. Santa Fe, NM, July 14-15, 2011.

Thoughts on Early Restoration and the Measurement of the Benefits of Enhanced Remediation in the Context of Natural Resource Damage Assessment. Ad-Hoc Industry Natural Resource Damage Group 8th Annual Natural Resource Damage Symposium. Washington, DC, October 25-26, 2011.

Natural Resource Damage Claims Using Habitat and Resource Equivalency: The Case of Wildland Fire. Law Seminars International, Natural Resource Damages: *Evolving strategic, tactical and substantive issues.* Washington, DC, February 14-15, 2013.

Climate Change and Wildland Fire Damages (with Christine Lee). Wildland Fire Litigation Conference, Monterey, California April 26, 2014.

Baseline: What Does It Really Mean and How Do You Prove It? Law Seminars International Conference on Natural Resource Damages. Washington, DC. April 2014.

Trustee Considerations in Applying Non-use Valuation Methods for Purposes of NRDA. Law Seminars International: The Eighth Annual Advanced Conference on Litigating Natural Resource Damages. Santa Fe, NM. July 24-25, 2014.

The Role of an Expert in Environmental Damages Litigation. Boston College School of Law, Boston, Massachusetts. March 2016.

Economics of Natural Resource Damage Assessment. University of Houston Law Center, Houston, Texas. September 2016.

A Practitioner's View: An Update on Tribal Damage Assessment. Law Seminars International, Tribal Natural Resource Damage Assessment. Seattle, WA. 16 December 2016.

Environmental and Natural Resource Economics in Practice: Water Wars in the American South. Yale University, New Haven, Connecticut. March 2017.

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PROFESSIONAL EXPERIENCE

Rutgers University 2011-present

Associate Professor 2016-present

Assistant Professor, School of Environmental and Biological Sciences, Department of Human Ecology; School of Law; Bloustein School of Public Policy and Planning

Courses Taught: Environmental Law and Policy; International Environmental Law; Climate Governance

Lewis and Clark Law School 2010-2011

Distinguished Environmental Law Scholar

Courses Taught: Deepwater Horizon Blowout Seminar

International Union for Conservation of Nature and Natural Resources (IUCN), Gland, Switzerland, 2010 to present

Counsel pro bono publico, member World Commission on Environmental Law –

Oral and written submissions to Seabed Disputes Chamber of International Tribunal for the Law of the Sea in Case No. 17, Responsibilities and obligations of States sponsoring persons and entities with respect to activities in the International Seabed Area.

Oral and written submissions to International Tribunal for the Law of the Sea in Case No. 21, Request for an advisory opinion submitted by the Sub-Regional Fisheries Commission. Transcripts, webcasts and documents for both available at www.itlos.org.

Legal advisor to IUCN delegation to Preparatory Committee established by General Assembly resolution 69/292: Development of an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction

University of California, School of Law, Berkeley 2006-2010

Lecturer

Courses Taught: Climate Change Law & Policy; International Environmental Law; International Courts and Tribunals.

Director, Global Commons Project and Associate Director, Center for Law, Energy and the Environment¹⁰²

United Nations Security Council (UN Compensation Commission), Geneva, Switzerland, 1999-2005

Senior Legal Officer (Team Leader), Legal Officer - Legal team reviewing environmental reparations from 1990-1991 Gulf War.

Goodwin, Procter, LLP, Boston, Massachusetts, 1998-1999

Associate Attorney - Legal services specializing in real estate, land use, wetlands, coastal zone, water, historic preservation and toxics.

¹⁰² Formerly the California Center for Environmental Law and Policy (CCELP)

United States Department of the Interior, Office of the Solicitor, Washington, D.C., 1997-1998
Attorney-Advisor, Solicitor's Honors Program

United States Department of the Interior, Office of the Secretary, Washington, D.C., 1996, **Law Clerk/Assistant** to Joseph Sax, Deputy Assistant Secretary for Policy

California Coastal Commission, San Francisco, California, 1995, **Law Clerk/Analyst**

Nuclear Claims Tribunal of the Marshall Islands, 1995-1996, **Consultant**

EDUCATION

University of California, Berkeley, School of Law (Berkeley Law), Juris Doctor, May 1997

The Fletcher School of Law and Diplomacy, Master of Arts, May 1993

PUBLICATIONS

Book:

GULF WAR REPARATIONS AND THE UN COMPENSATION COMMISSION: ENVIRONMENTAL LIABILITY (C.R. Payne & P.H. Sand, eds, Oxford University Press, 2011)(Author: chapter 1, *The UNCC Program: Environmental Claims in Context; chapter 5, Tracking and Follow-Up Programmes for Environmental Awards; Guidance for Researchers*).

Chapters:

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Guest Lectures – International Environmental Law, Yale College, Fall 2016.

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Towards a New Implementing Agreement under UNCLOS on Marine Biodiversity in Areas Beyond National Jurisdiction, International Law Weekend, American Branch of the International Law Association, New York, November 2015.

Protecting the Environment: Post-Conflict, Seminar on Protection of the Environment During Armed Conflict, United Nations Headquarters, New York, November 2015. (also co-organizer with Ambassador Marie

Jacobsson, International Law Commission Special Rapporteur; Carl Bruch, Environmental Law Institute).

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BAR MEMBERSHIP & PROFESSIONAL ACTIVITIES

Member, Massachusetts State Bar (active), California State Bar (inactive), US Supreme Court Bar Program Committee, American Society of International Law (2016-present)
 Executive Committee, Executive Council, American Society of International Law (2013-2016)
 Board of Editors, American Society of International Law, *Insights* (2008-2016)
 Co-Chair, Program Committee, American Society of International Law Annual Meeting 2012
 Expert Reviewer, IPCC, Fifth Assessment Report, Working Group 3
 IUCN Commission on Environmental Law, Specialist Groups: Oceans and Armed Conflict (2002 to present)
 Advisory Board, International Environmental Law IG, ASIL (2014 -2017), (chair 2008-2011)
 Rutgers Climate Institute (2013-present), Rutgers Initiative on Climate and Society (2011-2013)
 International Law Association (2011 to present) Member, Sustainable Development Study Group (2014);
 Member, Role of International Law in Sustainable Natural Resource Management for Development Committee (2015-present)
 European Society for International Law (2011 to present)
 Manuscript referee, Cambridge University Press, Journal of Applied Ecology, Edward Elgar, Journal of International Dispute Settlement, Transnational Environmental Law, Science, Griffith Law Review
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Date: 26 May 2017

Annex 2

G. Mathias Kondolf, PhD, Review of Costa Rica's Claims for Compensation in the Río San Juan Delta

May 2017

Review of Costa Rica's Claims for Compensation in the Río San Juan Delta

G. Mathias Kondolf, PhD

May 2017

Introduction and Scope

I am a fluvial geomorphologist, specializing in environmental management and restoration of rivers. I have been on the faculty of the University of California Berkeley for 29 years, where I teach hydrology, river restoration, environmental planning, and environmental science.

I have studied the geomorphology of the Río San Juan area, and the disputed area in particular, since 2012. Among other things, I have conducted studies of erosion and sediment delivery along the river, channel changes in the lower Río San Juan, and related analyses. In connection with this work, I have overflowed the river mouth five times from October 2012 to October 2016 and conducted three site visits over the same period, the most recent in October of 2016. I testified before the Court in the hearings of April 2015.

In connection with its claim for compensation, Costa Rica has submitted a report prepared by Fundación Neotrópica ("Neotrópica"), dated 3 June 2016, which values the environmental impact of Nicaragua's work in the disputed area.¹ I have reviewed that report, as well as the additional "Explanatory Addenda" dated 8 December 2016.² I have also reviewed the Memorial on Compensation to which those documents are annexed.

The present report addresses three aspects of the Neotrópica valuation: (1) its valuation of "soil formation/erosion control" services; (2) its valuation of "natural hazard mitigation" services; and (3) its application of a 50-year recovery period for impacts caused by Nicaragua's works.

In respect of these matters, it is my opinion that: (1) Nicaragua's works did not impact soil formation or erosion control services; (2) Nicaragua's works also had no impact on the ability of the disputed area to mitigate "natural hazards"; and (3) the recovery that has already occurred at the site to date indicates that realistic recovery periods range from 1-2 years for refilling the caños, 1-5 years for the regrowth of grass and underbrush, and 4-5 years for the re-establishment of trees sufficient to perform most functions expected from a woodland.³

¹ Fundación Neotrópica, "Monetary Valuation of the environmental damages arising from the construction of caños and clearing of trees and vegetation performed by the Government of Nicaragua in the Costa Rican territory of Isla Portillos, as required by the Judgment of the International Court of Justice of 16 December 2015" (3 June 2016), Annex 1 to the Memorial of Costa Rica on Compensation.

² Fundación Neotrópica, "Explanatory addenda..." to the 3 June 2016 report (8 December 2016), Annex 2 to the Memorial of Costa Rica on Compensation.

³ Neotrópica lists 14 sources as providing the inputs for its valuation (Table 2). I have previously reviewed many of those reports, and I refer the Court to the critique provided in my first report,

(1) Soil Formation/Erosion Control

Neotrópica assumes that Nicaragua's works impaired "soil formation/erosion control" services in the disputed area. However, those services are not provided by the impacted area and thus were not diminished as a result of Nicaragua's works.

Concerns regarding soil formation and erosion control services are generally understood to apply principally in upland sites, where deforestation and other disturbances risk causing increased erosion and delivery of fine sediment downslope. In such an environment, removing stabilizing vegetation or scraping off the soil surface could cause such impacts.

These concerns are not applicable to the disputed territory, which is an active river delta that is a zone of deposition of sediments eroded in the upper parts of the river basin [Figure 1]. The land is flat and the water surface barely slopes seaward. There are very high sediment loads reaching this naturally depositional zone. Such high rates of deposition led to rapid sedimentation and infilling of the Bay of San Juan in the 19th century. Since the mid-20th century, sediment loads have increased at least 10-fold. (Andrews, 2015; Kleinn, et al., 2002.)

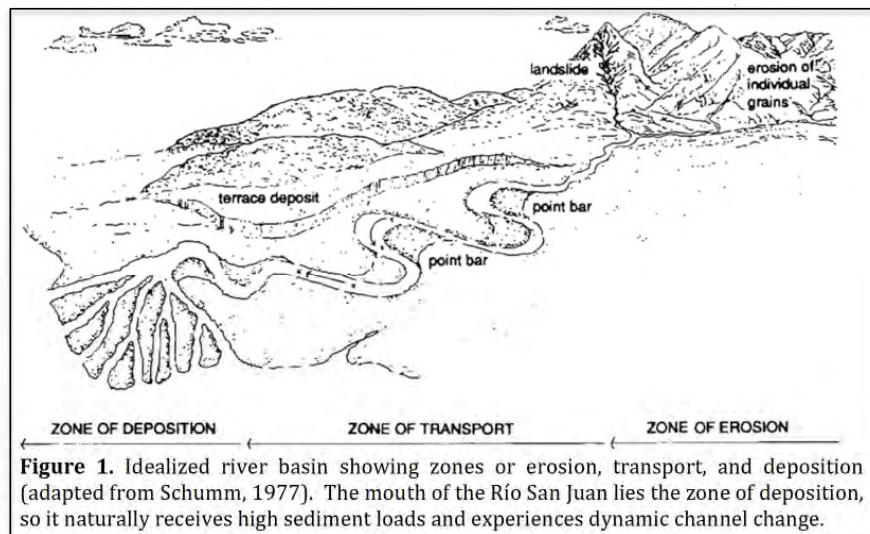


Figure 1. Idealized river basin showing zones of erosion, transport, and deposition (adapted from Schumm, 1977). The mouth of the Río San Juan lies the zone of deposition, so it naturally receives high sediment loads and experiences dynamic channel change.

For these reasons, erosion is not an issue in the disputed area. Rather, it is an area where the deposition of sediment happens constantly and rapidly, and where small irregularities in the land surface (such as excavations) are quickly smoothed out by deposition of sediment. Indeed, the entire area owes its

^{“Distributary Channels of the Río San Juan, Nicaragua and Costa Rica: Review of Reports by Thorne, UNITAR, Ramsar, MEET, and Araya-Montero (July 2012), Appendix 1 to the Counter-Memorial of Nicaragua in the underlying case.”}

existence to the deposition of sediments that have been transported from upstream sites. As is typical of deltas, this dynamic area is characterized by a complex of multiple, shifting distributary channels (*caños*) that open and close in response to high flows and deposition of sediments. At a broad scale, the delta landform can be seen as existing in the balance between the supply of sediment from upstream and its deposition within the delta, which tend to build the delta, and natural subsidence (from compaction of sediments) and coastal wave erosion, which tend to reduce the delta.

Due to the depositional nature of the delta region, the *caños* that were excavated in 2010 and 2013, small features to begin with, rapidly filled with sediment and revegetated. This is documented in aerial imagery and field evidence.⁴ The 2010 *caño* filled in within less than a year, and the 2013 eastern *caño* had largely filled in by the time Costa Rica built a dyke across it in March 2015. By that date, the *caño*'s dimensions were smaller than expected by Costa Rica, as Annex 4 to the Memorial on Compensation explains (pp.14-15), due to rapid natural deposition and revegetation. After the dyke was installed, there was further sedimentation of the *caño*.

From field evidence presented in various reports, it is clear that the sites have already recovered to a significant degree: the *caños* have filled in with sediment and revegetated. For example, the Ramsar Advisory Mission found, in its 2014 report (on Mission 77), that there is a “high capability for natural regeneration of vegetation in this area” (p.14). That assessment accords with the views expressed by Professor Thorne.⁵

Sequential satellite imagery from 2010-2017 (see Appendix A⁶) shows clearly the extent of disturbance associated with digging the 2010 *caño* (image of 2010-11-19), and the rapidity of the *caño* filling in, which had largely occurred by the following year (image of 2011-12-26). Rapid sedimentation of the *caño* is expected in this environment, as depressions tend to have greater deposition rates, such that the topography of floodplains and delta plains tends to even out over time.

The sequential images also show the rapidity of tree re-establishment, which had largely occurred four years later (image of 2014-09-26), with individual trees clearly visible on the imagery. It is not possible to measure tree heights from the imagery, but the plan-form tree outlines visible on the imagery have similar form

⁴ I also note that rather than being “removed” from the wetland, the soil that was excavated from the *caños* was redistributed along the margins of the *caños*. CRM Annex 155, pp.32-33; Thorne, 2013, p.3 (reporting that the “freshly dredged sediment” extracted during Nicaragua’s works in 2013 was visible in “patches...on the floodplain adjacent to the new *caño* to the east,” having been deposited there by the “spoil pipes” attached to the dredger).

⁵ Testimony of Prof. C. Thorne on the afternoon of 14 April 2015 (CR 2015/3, p.42): “Vegetation does recover very quickly in these areas.”

⁶ In addition to the satellite imagery of the 2010 *caño* discussed in this report, Appendix A also includes satellite imagery of the areas felled in 2010, as well as satellite imagery of the site of the 2013 *caño* from 2013-2017.

and dimensions to those of the surrounding woodland by 2014. Also visible on the imagery is the extensive blowdown from the hurricane of November 2016, which can be clearly identified in the image of 2016-12-02.

The rapidity of the re-sedimentation of both caños illustrates the irrelevance of the “erosion control” service in these locations. Even if the site of the caños provided the claimed erosion control “service,” there would be no ongoing harm, because the caños have filled and revegetated, as can be seen in the sequential satellite imagery.

(2) “Natural Hazards” Mitigation

Neotrópica claims losses due to “natural hazards mitigation” services, evidently referring to “flood and storm protection...the ability of ecosystems to reduce natural hazards and disasters” (p.18). There is no geomorphological basis for this claim.

In that regard, the Neotrópica report does not describe how the soils or vegetation in the caño sites regulate floods. In fact, these are flooded forests, which are often naturally inundated. Excavating a small caño or clearing patches of vegetation within this environment would not impair natural regulation of flooding.

Neotrópica assumes that there was a “hydrological impact on the area.”⁷ However, from a scientific perspective, there was no material hydrological impact from the caños, even when they remained open. None of the sources cited by Neotrópica suggests that such an impact occurred.⁸ Rather, they posited the existence of certain risks, such as breaching of the Harbor Head Lagoon barrier spit, capture of the river, saltwater intrusion into the small lagoon at the end of the 2013 caño, rupture of the nearby beach barrier, “complex process-response mechanisms,” and “serious and irreversible morphological and environmental degradation.” None of these risks materialized.

Viewing the site in its larger context, even if there were some flood “mitigation” function (i.e., flood reduction) that could have been provided by the sites of the 2010 and 2013 caños, there are no settlements that would be affected either upstream or downstream. Thus, Neotrópica’s claim that it “determined that the natural hazard mitigation service is important to the area, the infrastructure, and nearby towns, especially because these areas are highly vulnerable to the effects of climate change” (p.45) is contradicted by conditions on the ground. The only nearby settlement is San Juan del Norte, Nicaragua, which is located

⁷ See Table 12, listing a description of this “impact” as “required data” for this aspect of the valuation.

⁸ Neotrópica indicates that all 14 of the reports it cites provide data relevant for valuing the impact to “natural hazards mitigation” allegedly caused by Nicaragua’s works (Table 12). With the exception of report #11 (which is not in the record and does not appear to be publicly available), I have reviewed all of these documents, some of which I critiqued in my July 2012 report.

approximately 4 km west of the 2013 caños and approximately 6 km west of the 2010 caño, on a different waterbody, the Río Indio. Any changes induced by the caños, even while they were open, could not have affected flooding or the impacts of other natural hazards at San Juan del Norte.⁹

It is notable that Hurricane Otto made landfall in the disputed area in November 2016. There is no evidence that the caños or related clearing of trees and underbrush had any appreciable impact on the way the storm impacted the disputed area or the surrounding communities and infrastructure.

(3) Recovery Time

Neotrópica assumes that it will take 50 years for the disputed area to recover from the impacts of Nicaragua's works. The basis for this recovery time is not clearly articulated, but it appears to be built on two flawed assumptions.

First, Neotrópica states (p.31): "Since the action may affect one or more resources, the time for restoration must correspond to the resource with the longest recovery time." However, there is no scientifically valid reason to apply the recovery time for the longest recovering resource, which Neotrópica assumes is trees, to all elements of the site, including soil, grass and shrubby vegetation, which recovered much more rapidly.

Second, Neotrópica indicates that the 50-year recovery period for trees is based on the assumption that the felled trees had an average age of 115 years, with 46% being over 100 years old (Explanatory Addenda, p.9). These figures rely on data from the 2010 caño as reported in CRM Annexes 145 and 154. However, as indicated in the critique contained in my July 2012 report, they were calculated using growth rates that are probably less than half the correct growth rate (thus yielding tree ages that are too old), and by including only trees with diameters larger than 10cm, which distorted the data set and artificially increased the percentage of the area reported to have been occupied by larger trees.¹⁰ This means that the average tree age and distribution values for the area of the 2010 caño used by Neotrópica are incorrect.

⁹ The San Juan delta area is materially different from the coastal mangroves, wetlands, and reefs described in the four studies from which Neotrópica derives its estimated ecosystem values for hazard mitigation services (p.158). In those cases—from Thailand, Mexico, and Belize, respectively—the mangroves, wetlands, and reefs at issue were situated in large, linear features along the coast, acting as a significant barrier to wave energy and thus protections for human settlements along the coast. (Barbier et al., 2002; Barbier, 2007; Camacho-Valdez, et al., 2014; Cooper, et al., 2009.) In contrast, the small areas of flooded forest affected by the caños cleared by Nicaragua are not large enough or located in such a way (i.e., as a protective line between the ocean and human settlements or infrastructure) that they could protect nearby settlements.

¹⁰ Indeed, the Costa Rican reports on which Neotrópica relies reported tree ages that are contradicted by Professor Thorne's estimate of the age of the land on which they grew. In his 2015 report (p.16), Professor Thorne indicated his opinion that the oldest tree felled in the location of the 2010 caño was 248 years old. The Costa Rican reports on which Neotrópica relies estimated tree ages for this location of up to 296-353 years. See CRM Annexes 145 and 154.

In addition, Neotrópica applies these erroneous values to the site of the 2013 caño. There is no basis for doing so because, as Professor Thorne has explained, the 2013 caño was constructed in a location where the vegetation was different and younger.¹¹ Accordingly, it is incorrect for Neotrópica to conclude that it would take trees 50 years, on average, to recover.

In light of the evidence available, realistic recovery times would be 1-2 years for refilling the caños, based principally on empirical observations on aerial imagery, and 4-5 years for re-establishment of trees (reflecting the rapid growth rates in this environment). The trees present in 4-5 years would not be equivalent to the largest specimens reported as having been cut during the clearance of the 2010 caño, but they would perform most functions expected from a woodland, including providing habitat and food resources.

Based on these principles and the changes observed on the satellite imagery, I estimate recovery time for other functions and their potential benefits as follows:

- For grass and underbrush, 1-5 years, based on recovery patterns observed in aerial imagery.
- For uptake of carbon by trees, 1-5 years, based on recovery observed on aerial imagery and accounting for the more rapid uptake of carbon by growing trees than by mature, old-growth trees (a point relevant to mitigation of greenhouse gas emissions by sequestration of carbon in vegetation).
- For habitat and biodiversity, 10-20 years, reflecting the fact that while basic ecosystem functions would be restored within 1-2 years, larger trees offer greater complexity in habitats. Thus, to increase habitat complexity, recovery should allow for growth of larger trees, which is rapid in this environment (as visible on aerial imagery), but which slows after approximately 10 years.

¹¹ Testimony of Prof. C. Thorne on the afternoon of 14 April 2015 (CR 2015/3, p.42): "The nature of the ground and the vegetation through which the first caño was cut, in my opinion, differed from that of the second and third caños, which are much further north and on land which is much younger, because it was only created by the progradation of the delta many years after the land at the root of the delta. Consequently, because it was not as old and as well established, it did not have the mature trees of great antiquity that were destroyed when the first caño was cut. Therefore, I would say, in my opinion, the environmental impact of the second and third caños was not as great as that of the first caño."

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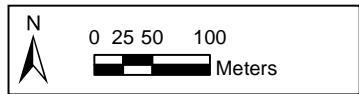
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APPENDIX A

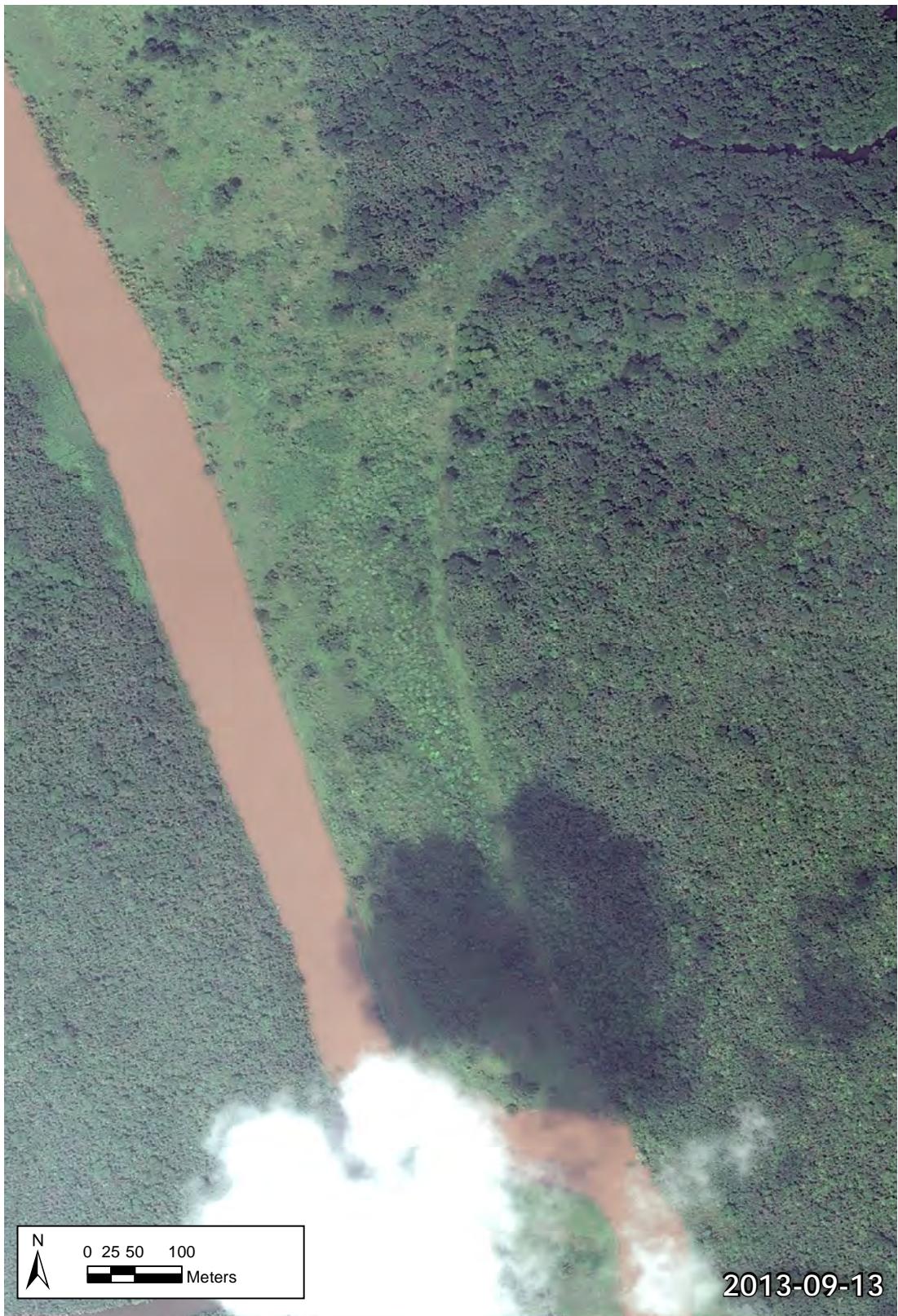
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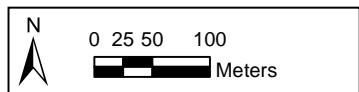
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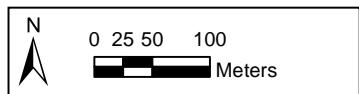
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Annex 2



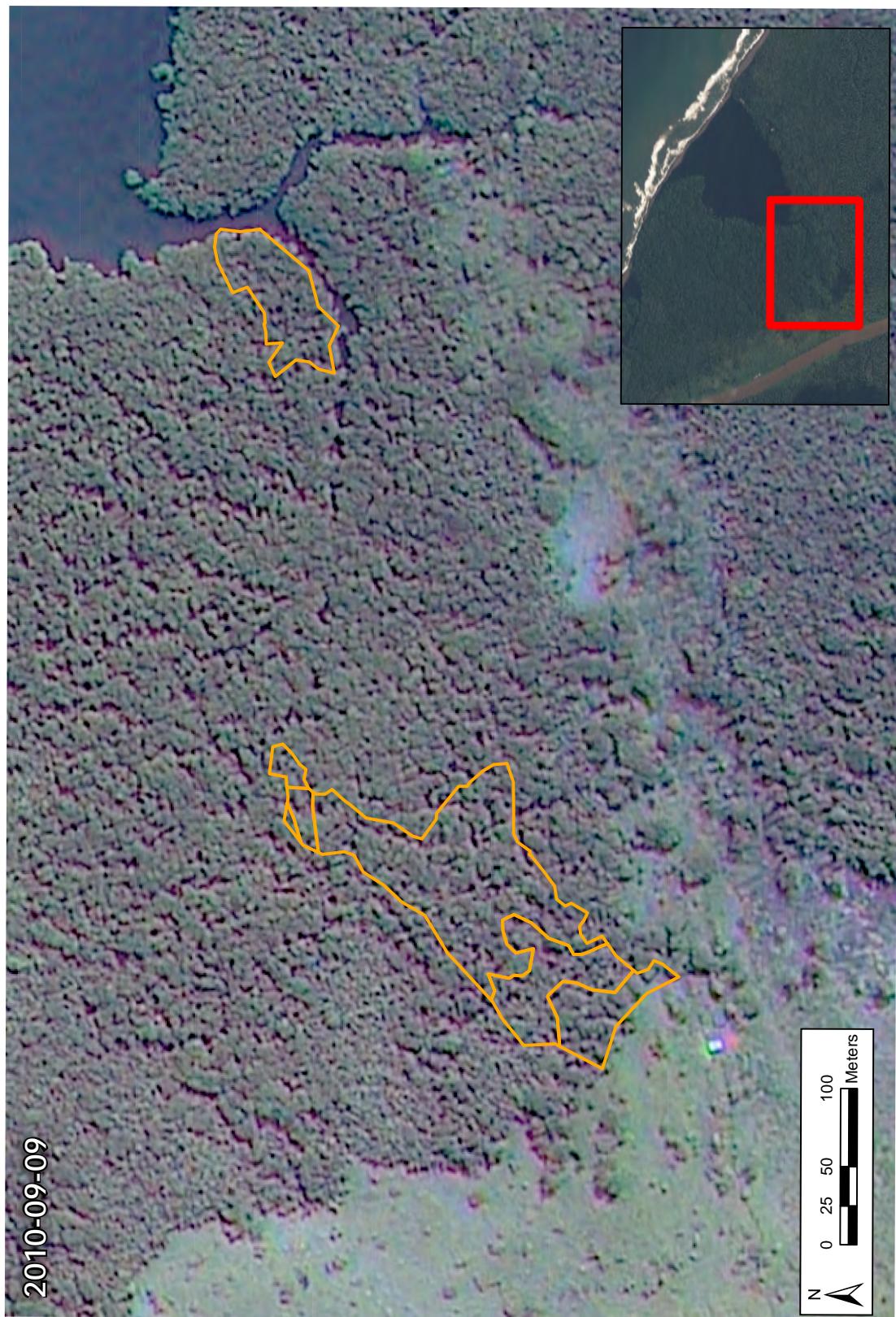


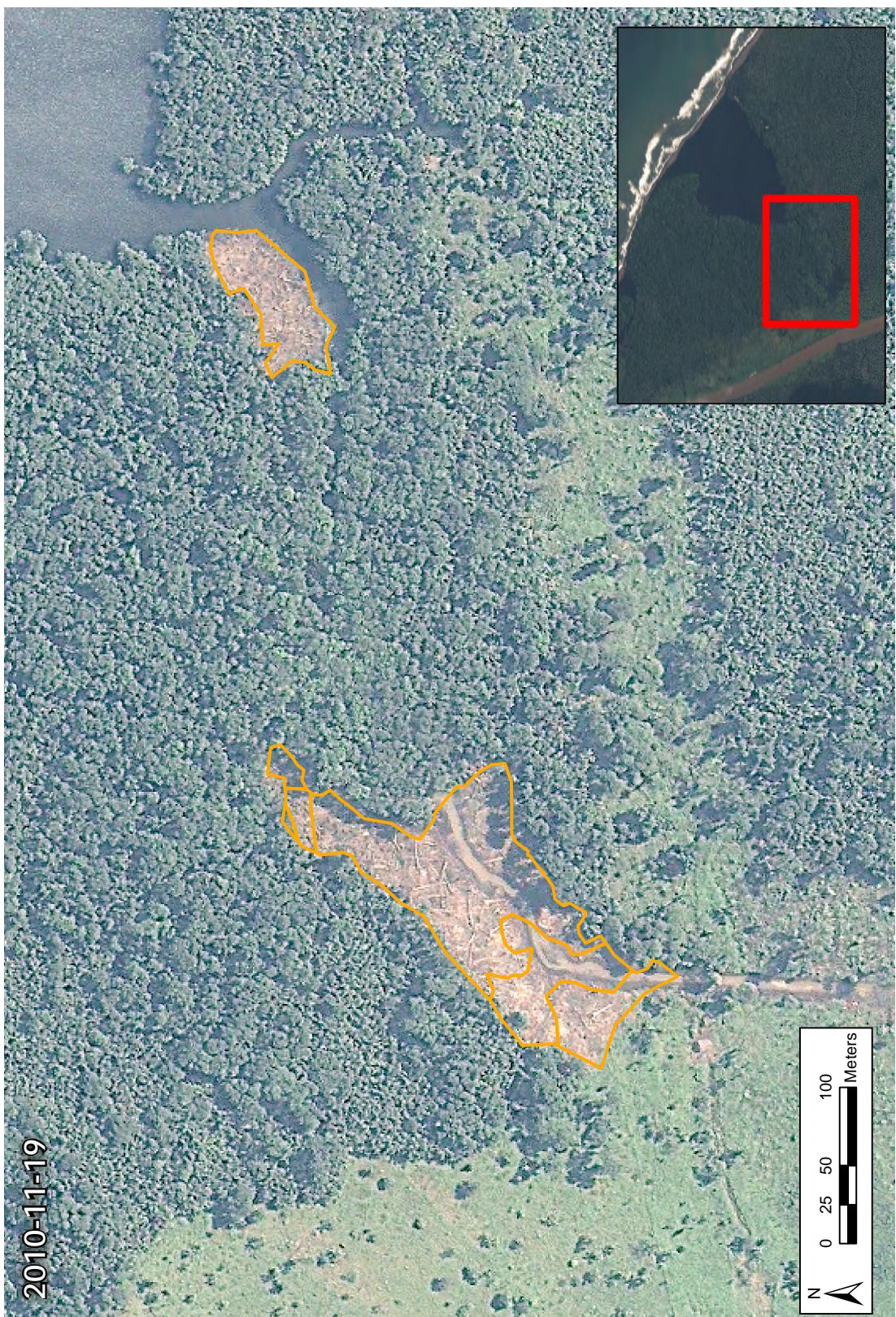
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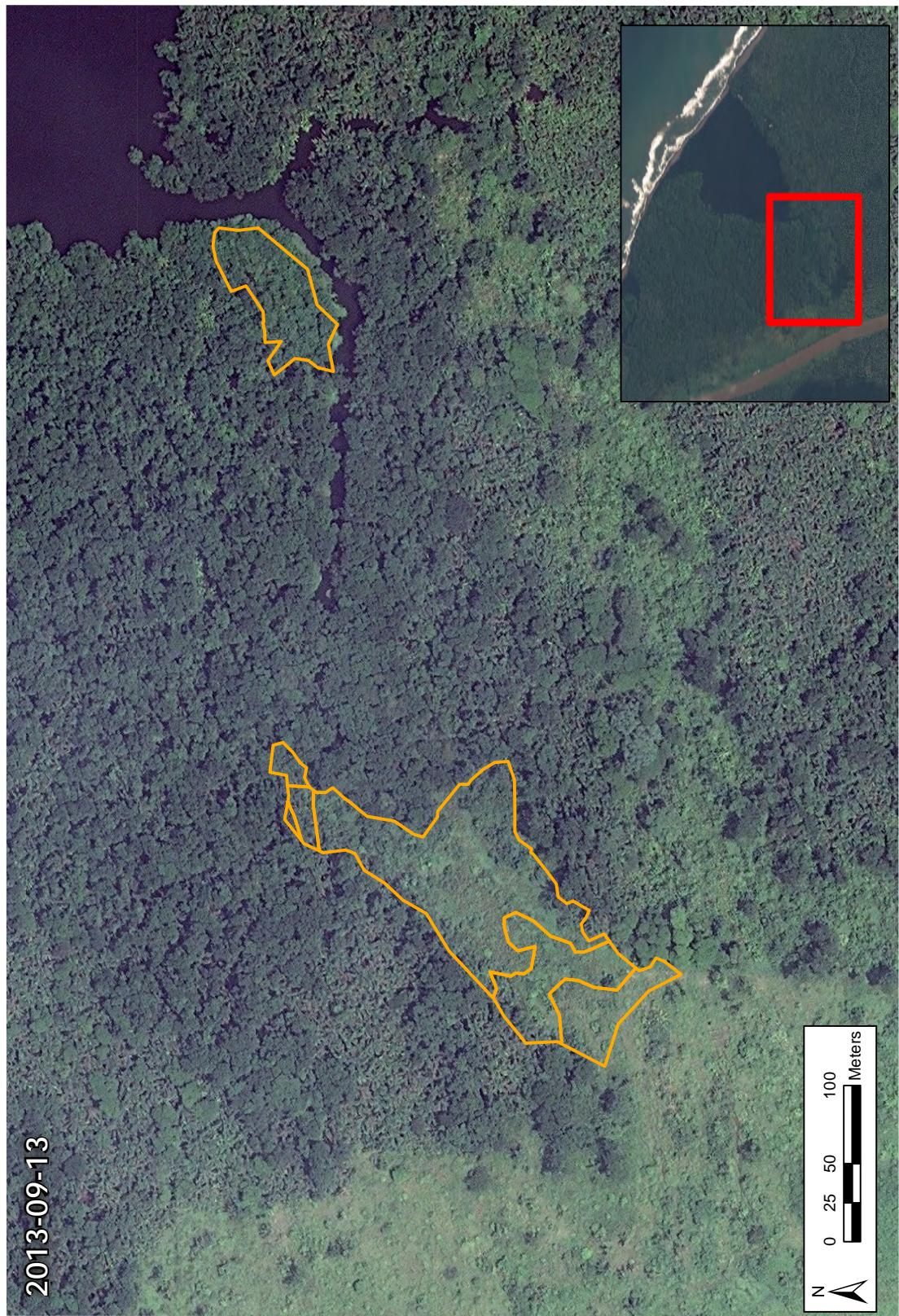


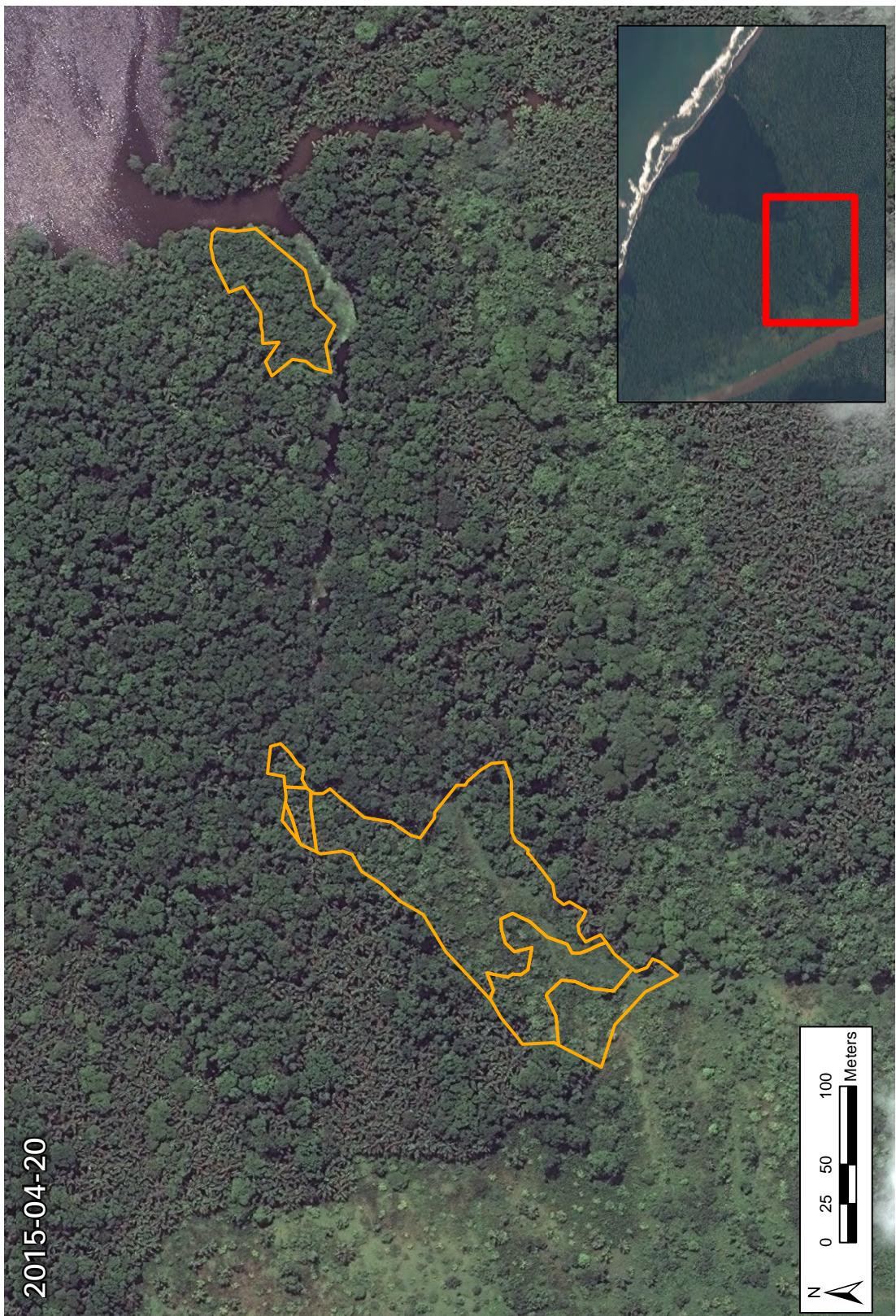
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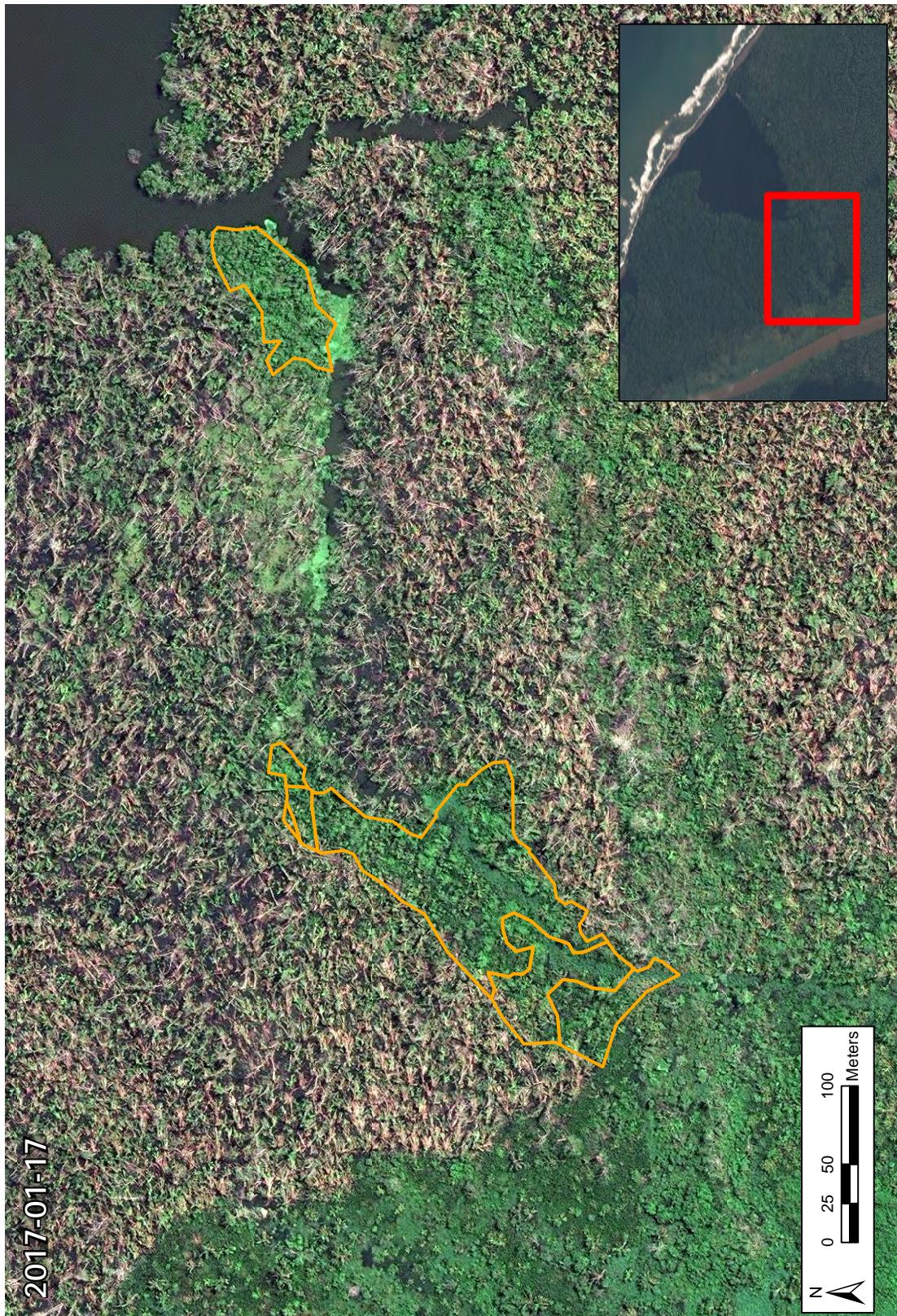
**2010 CAÑO
FELLED AREAS**











2013 CAÑO

SATELLITE IMAGERY
2013-2017

Annex 2









Annex 2







2017-01-17



Annex 3

**Summary Chart of the Information Provided by the Institutions
Responsible for Addressing the Damages Caused by Nicaragua
in the Isla Portillos Area**

Transmitted 7 June 2016

Excerpt

(English Translation)

**SUMMARY CHART OF THE INFORMATION PROVIDED BY THE INSTITUTIONS RESPONSIBLE FOR ADDRESSING
THE DAMAGES CAUSED BY NICARAGUA IN THE ISLA PORTILLOS AREA**

No.	Institution	Item	Description	Relationship with the provisions of the Judgment of the ICIJ	Amount USD
1	Tortuguero Conservation Area (ACTO) ¹	Wages	Includes the costs incurred in the payment of personnel wages per day of work, which corresponds to environmental attention to protective activities on Isla Portillos.	The staff of the Tortuguero Conservation Area is the staff directly responsible for the protection of the environment in the disputed area. In this sense, they are responsible for all of the actions necessary to monitor, assess, and mitigate damages caused by the excavation of the three "pipes" and the surrounding areas that were drilled by Nicaragua. Due to the actions of Nicaragua, this personnel had to devote a significant amount of time to internal and institutional coordination meetings, patrolling, joint missions with the personnel of the Secretariat for the Ramsar Convention, measurement and data analysis, and mitigation that otherwise would have been unnecessary.	29,412.88
2	Conservation Area	FOOD	Calculations have been done based done the official rate	Since ACTO personnel had to travel and remain on the	8,886.53

¹ Corresponds to 162 visits (from October 10, 2010 until November 16, 2015) to the area in dispute by personnel from the Tortuguero Conservation Area on surveillance and environmental conservation missions, equipment maintenance, and coordination of joint meetings of the Ramsar Secretariat, including those held on October 22 and 25, 2010, January 7, April 5–6, 2011, January 30, August 3, 2012, March 7, September 18, December 10, December 11, 2013, March 11, July 25, November 12, December 5, December 17, 2014, March 26 to April 10, June 9, July 8, and October 3, 2015.

			Temporary measures from March 8, 2011.	
8	Ministry of Security	Wages of Law Enforcement and Border Police forces.	<p>Includes the salaries of the 48 Law Enforcement officers that were assigned to the area adjacent to the Los Portillos Lagoon and Dulce Lagoon from March 2011 to September 2013, and to 46 officers from the Border Police that were assigned to those same outposts from October 2013 to December 2015. The total number of officers is divided into two groups that alternate 10-day continuous work shifts in the region and 10 days of break outside the region. During their stay in the area, they worked in two 12-hour shifts.</p> <p>Nicaragua's actions in Costa Rican territory, according to the Court's ruling, assign police resources from other regions of the country, to create new police outposts and a new division of the Border Police, first, to avoid Nicaragua claiming sovereignty over additional territories in the region, and second, to provide security for the territory in dispute from the adjacent area, in accordance with the Order of Temporary Measures dated March 8, 2011.</p> <p>The police forces were to surveil the Los Portillos Lagoon, right next to the disputed area, had to be assisted from the Agua Dulce Lagoon outpost. None of these police outposts existed prior to the onset of the conflict. The border police were created as a response to Nicaragua's military presence in Costa Rican territory, and once this police division was sufficiently organized, it took</p>	3,092,834.17

		control of the outposts in the Agua Dulce Lagoon and in the adjacent area of the Los Portillos Lagoon in October 2013.	\$2,062.17
9	Ministry of Security	Operating costs of police outposts. Includes the costs of construction and equipment for the police outposts in the area adjacent to the Los Portillos Lagoon and Agua Dulce Lagoon.	Nicaragua's actions in Costa Rican territory, according to the Court's ruling, required the Costa Rican authorities to assign police resources from other regions of the country, to create new police outposts and a new division of the Border Police, first, to avoid Nicaragua claiming sovereignty over additional territories in the region, and second, to provide security for the territory in dispute from the adjacent area, in accordance with the Order of Temporary Measures dated March 8, 2011. In order to comply with these objectives, it was necessary to construct two police outposts: one in the area immediately adjacent to the area in dispute, along the edge of the Los Portillos Lagoon, and another nearby in a location accessible by boats of the Coast Guard Service, in Agua Dulce Lagoon.
10	National Emergency Commission	Transportation costs of Ramsar Mission and Ministry of Environment and Energy of Costa Rica (MINAE) personnel.	Includes the costs of flight hours required to transport the Ramsar environmental risks generated by the construction of the East pipeline, it was necessary to coordinate a joint mission with MINAE environmental protection personnel and personnel from the Secretariat.

CUADRO RESUMEN DE LA INFORMACIÓN PROPORCIONADA POR LA INSTITUCIONES ENCARGADAS DE ATENDER LOS DAÑOS OCASIONADOS POR NICARAGUA EN LA ZONA DE ISLA PORTILLOS

Nº	Institución	Ítem	Descripción	Relación con las disposiciones de la Sentencia de la CIJ	Valor en US \$
1	Área de Conservación Tortuguero (ACTo) ¹	Salarios	Comprende los costos incurridos en el pago de salarios de cada miembro del personal por día de trabajo, que corresponde a la atención a las acciones de protección del medio ambiente en Isla Portillos.	El del área de Conservación Tortuguero es el personal directamente responsable de la protección del medio ambiente en la zona en litigio. En ese sentido son responsables de todas las acciones necesarias para supervisar, evaluar y mitigar los daños provocados por la excavación de los tres "caños" y las zonas circundantes que fueron taladas por Nicaragua. Debido a las acciones de Nicaragua, este personal debió dedicar una cantidad importante de tiempo para reuniones internas e interinstitucionales de coordinación, patrullaje, misiones conjuntas con el personal de la Secretaría de la Convención Ramsar, medición y análisis de los datos y medidas de mitigación que de otro modo no hubiera sido necesario.	29,412.88
2	Área de Conservación	ALIMENTACIÓN	El cálculo se ha realizado en función de la tarifa oficial	Debido a que el personal de ACTo tenía que viajar y permanecer en la	8,886.53

¹ Corresponde a 162 visitas (desde el 10 de octubre de 2010 hasta 16 el noviembre, 2015) a la zona en disputa por el personal del Área de Conservación Tortuguero en misiones de vigilancia y conservación del medio ambiente, mantenimiento de equipos y coordinación de reuniones y misiones conjuntas de la Secretaría de Ramsar, incluyendo las que tuvieron lugar el 22 de octubre , 25 de Octubre de 2010 , el 7 de enero , 5-6 de abril de 2011, 30 de enero , 3 agosto de 2012, 7 de marzo , 18 de septiembre , 10 de diciembre , 11 de diciembre de 2013, 11 de marzo , 25 de julio , 12 de noviembre , 5 de diciembre de 2014, 26 de marzo al 10 de abril , 9 de junio , 8 de julio y 3 de octubre del año 2015 .

			Medidas provisionales del 8 de marzo de 2011.
8	Ministerio de Seguridad	Salarios de los efectivos de la Fuerza Pública y de la Policía de Fronteras	<p>Comprende los sueldos de los 48 policías de la Fuerza Pública que se asignaron a los puestos policiales en la zona adyacente a la Laguna Los Portillos y Laguna de Agua Dulce desde marzo de 2011 a septiembre de 2013 y a 46 oficiales de la Policía de Fronteras que se asignaron a esos mismos puestos de octubre de 2013, a diciembre de 2015. El número total de policías se divide en dos grupos que se alternan en turnos de 10 días de trabajo continuo en la zona y 10 días de descanso fuera del área. Durante su estancia en la zona trabajaban en 2 turnos de 12 horas.</p> <p>Las acciones de Nicaragua en territorio costarricense, según lo determinó la Corte, obligó a las autoridades costarricenses a asignar recursos policiales de otras regiones del país, crear nuevos puestos policiales y una nueva división de Policía de Fronteras, primero, para evitar, que Nicaragua reclamara soberanía sobre territorios adicionales en la región, y segundo, para brindar seguridad al territorio en disputa desde la zona adyacente, de conformidad con la Providencia de Medidas Provisionales del 8 de marzo de 2011. Estos efectivos de policía debían vigilar las acciones del ejército nicaragüense y proporcionar seguridad desde territorio de indisputable soberanía costarricense. El puesto policial adyacente a la Laguna Los Portillos, justo al lado de la zona en litigio debía ser atendido desde el puesto de Laguna de Agua Dulce. Ninguno de esos dos puestos policiales existía antes del inicio del conflicto. La policía fronteriza fue creada como una respuesta a la presencia militar de Nicaragua en territorio costarricense y una vez que esta división policial estuvo suficientemente organizada tomó</p>

			control de los puestos en Laguna de Agua Dulce y en la zona adyacente a la Laguna Los Portillos, en octubre de 2013.	
9	Ministerio de Seguridad	Costos operativos de puestos policiales.	Comprende los costos de construcción y equipamiento para los puestos de policía en la zona adyacente a la Laguna Los Portillos y Laguna de Agua Dulce.	Las acciones de Nicaragua en territorio costarricense, según lo determinó la Corte, obligó a las autoridades costarricenses a asignar recursos policiales de otras regiones del país, crear nuevos puestos policiales y una nueva división de Policía de Fronteras, primero, para evitar que Nicaragua reclamara soberanía sobre territorios adicionales en la región, y segundo, para brindar seguridad al territorio en disputa desde la zona adyacente, de conformidad con la Providencia de Medidas Provisionales del 8 de marzo de 2011. Con el fin de cumplir estos objetivos fue necesario construir dos puestos policiales, uno en el área inmediatamente adyacente a la zona en disputa, en la margen de la Laguna Los Portillos y otra cerca en un punto accesible por barcos del Servicio de Guardacostas, en Laguna de Agua Dulce.
10	Comisión Nacional de Emergencias	Costos de transporte de Misión Ramsar y personal del MINAE.	Comprende los costos de las horas de vuelo requeridas para el transporte de la misión de Ramsar y el personal del MINAE al territorio en disputa el 25 de julio de 2014.	Para determinar el nivel y tipo de riesgos ambientales generados por la construcción del caño Este, fue necesario coordinar una misión conjunta con personal de protección del medio ambiente del MINAE y personal de la Secretaría

Annex 4

**José María Tijerino Pacheco, Outgoing Report, Period 8 May
2010 to 30 April 2011, Ministries of State and Police and Public
Security**

April 2011

Excerpt

(English Translation)

OUTGOING REPORT

Period May 8, 2010 to April 30, 2011

**MINISTRIES OF STATE AND POLICE AND
PUBLIC SAFETY**

José María Tijerino Pacheco

April 2011

1

LEGAL REFERENCES

In accordance with Guideline R-CO-61 dated June 24, 2005, published in The Gazette (La Gaceta) No. 131 dated July 7, 2005 and Article 12 of the General Domestic Control Act, which establishes that chiefs and subordinate office-holders must submit an Outgoing Report and formally turn over the respective entity or agency to their successor, the undersigned hereby submits the following Outgoing Report for the period in which he acted as Minister of State and Police and Public Safety, pursuant to Presidential Agreement No. 001-P dated May 8, 2010. Certificate of Delivery of Property dated August 25, 2010.

police response in new fields of action, have spurred the establishment of new work strategies.

An investment project is made up of a series of actions that in their pre-investment, investment, and execution phases enable the administration to provide a comprehensive solution with adequate planning for the legal system and institutional control of available economic resources, which is a necessary issue for transparent management of the apportioned budget.

Within this context, Law Enforcement developed a series of projects which, due to their great importance, deserve special mention.

Reactivation of the Border Police

As a result of events on the northern border in recent months, the urgent goal was established of reactivating the Border Police in order to ensure the safety of citizens and respect for national sovereignty, planning, organizing, directing, and executing the actions necessary for such purpose.

The area of operation is the entire land border line, which extends for 300 kilometers in the northern zone and 363 kilometers in the southern zone.

During this period, steps were taken to form the Border Police. The first 150 officers assigned to the border regions were trained, for whom 400 complete uniforms and 400 weapons were purchased. We recommend recruiting 1,850 additional officers in the midterm.

In parallel, the creation of two regional offices under the organizational structure of the Ministry of Public Safety is currently in the approval process by the Ministry of National Planning and Economic Policy: the Chorotega Northern Region with the counties [*cantones*] of La Cruz, Los Chiles, and Upala, and the Caribbean Border Region with the counties of Sarapiquí, Talamanca, and Pococí.

In addressing the area, we had the collaboration of the Ministry of Public Works and Transportation, which authorized a route from La Aldea to Fátima de Sarapiquí and from there to Delta Costa Rica in the Northern Area. The opening of another transportation route is expected from Boca San Carlos to Puerto Lindo; in addition,

a bridge is in planning at the source of the river Río Colorado to enable transportation to Isla Calero.

With regard to the infrastructure needed for the operation, we are working on the remodeling and construction of the first 30 out of a total of 45 police outposts, with a capacity of 40 officers each.

Implementation of motorized groups

These groups were implemented to provide immediate response in vulnerable communities in inner cities, where heavy traffic or poor road planning hinder immediate police response. Using motorcycle patrols, which facilitates and improves movement, we intend to improve response times, strengthen police-community relations, and reduce operating costs.

To achieve this, the need to acquire motorcycles with the technical specifications and performance needed to meet the outlined goals was forecast through a prefeasibility study. We planned to acquire forty-three 400 cc dual sport dirt bike type motorcycles, which is a suitable resource to implement this project.

United, Safe, and Healthy Communities Program

The United, Safe, and Health Communities Program carried out comprehensive interventions in marginalized urban communities to simultaneously combat health, housing, safety, education, dependent care, and transportation problems and preparation for the working world.

The communities chosen in the first year were the four central districts of San José (Merced, Hospital, Catedral and Carmen), San Pedro de Montes de Oca, San Juan de Dios de Desamparados, León XIII in Tibás, San Francisco (Guararí) in Heredia, Quepos in the Cantón de Aguirre and Barrio Cristóbal Colón (Cieneguita) in Limón.

INFORME DE FIN DE GESTIÓN
Período 08 de mayo del 2010 al 30 de abril del 2011

**MINISTERIOS DE GOBERNACIÓN Y POLICÍA
Y
DE SEGURIDAD PÚBLICA**

José María Tijerino Pacheco

Abril, 2011

REFERENCIA LEGAL

De acuerdo con la Directriz R-CO-61 del 24 de junio del 2005, publicada en La Gaceta N° 131 del 07 de julio del 2005 y el artículo 12 de la Ley General de Control Interno, el cual establece que los jerarcas y los titulares subordinados deben presentar un Informe de Fin de Gestión y realizar la entrega formal del ente u órgano respectivo a su sucesor, el suscrito hace entrega del siguiente Informe de Fin de Gestión por el periodo en que se desempeñó como Ministro de Gobernación y Policía y de Seguridad Pública, según Acuerdo Presidencial N° 001-P del 08 de mayo del 2010. Acta de Entrega de Bienes de fecha 25 de agosto del 2010.

respuesta policial en nuevos campos de acción, han motivado que se establezcan nuevas estrategias de trabajo.

Se comprende como proyecto de inversión una serie de acciones que en sus etapas de pre-inversión, inversión y ejecución, permiten a la administración dar solución integral con una planificación adecuada al ordenamiento jurídico y al control institucional de los recursos económicos disponibles, tema necesario para gestionar con transparencia el presupuesto asignado.

Dentro de este marco, la Fuerza Pública elaboró una serie de proyectos que por su gran importancia merecen una mención especial.

Reactivación de la Policía de Fronteras

Producto de los hechos acaecidos en meses recientes en la frontera norte, se estableció como objetivo prioritario la reactivación de la Policía de Fronteras con el fin de velar por la seguridad ciudadana y el respeto de la soberanía nacional, planificando, organizando, dirigiendo y ejecutando las acciones necesarias para tal fin.

El área de operación es todo el cordón fronterizo terrestre, el cual tiene una extensión de 300 kilómetros en la zona norte y de 363 kilómetros en la zona sur.

En este periodo se implementaron acciones para la conformación de la Policía de Fronteras. Se capacitó a los primeros 150 oficiales destinados a las áreas fronterizas, para los que se adquirieron 400 uniformes completos y 400 armas. Se recomienda reclutar 1.850 oficiales más a mediano plazo.

En otro orden de ideas, actualmente se encuentra en proceso de aprobación por parte del Ministerio de Planificación Nacional y Política Económica, la creación de dos direcciones regionales dentro de la estructura orgánica del Ministerio de Seguridad Pública: la Región Chorotega Norte con los cantones de La Cruz, Los Chiles y Upala, y la Región Frontera Caribe con los cantones Sarapiquí, Talamanca y Pococí.

Para atender la zona se contó con la colaboración del Ministerio de Obras Públicas y Transportes, que habilitó un camino desde La Aldea a Fátima de Sarapiquí y de ahí hasta Delta Costa Rica en la Zona Norte. Se espera la apertura de otra vía de comunicación de Boca San Carlos hasta Puerto Lindo; asimismo se tiene proyectado

un puente en el nacimiento del Río Colorado que permita la comunicación con la Isla Calero.

Respecto a la infraestructura necesaria para la operación, se trabaja en la remodelación y levantamiento de los primeros 30 puestos policiales de un total de 45, con capacidad para 40 funcionarios cada uno.

Implementación de grupos de motorizados

Estos grupos fueron implementados para brindar respuesta inmediata prioritariamente en las comunidades vulnerables y en los centros de ciudad, donde el alto tránsito o la mala planificación vial inciden en la inmediatez de la respuesta policial. Mediante el patrullaje en motocicleta, medio que facilita y agiliza el desplazamiento, se pretende mejorar los tiempos de respuesta, fortalecer la relación Policía - Comunidad y reducir los costos operativos.

Para lograr lo anterior se proyectó mediante estudio de prefactibilidad la necesidad de adquirir motocicletas con las especificaciones técnicas y de desempeño necesarias para cumplir los objetivos trazados. Se proyectó adquirir 43 motocicletas tipo montañera, doble propósito, 400 centímetros cúbicos, lo cual es un recurso idóneo para desarrollar dicho proyecto.

Programa Comunidades Solidarias, Seguras y Saludables

El Programa Comunidades Solidarias, Seguras y Saludables realizó intervenciones integrales en comunidades urbano marginales para combatir simultáneamente los problemas de salud, vivienda, seguridad, educación, cuidado de dependientes, transporte y preparación para el mundo del trabajo.

Las comunidades seleccionadas en el primer año fueron los cuatro distritos centrales de San José (Merced, Hospital, Catedral y Carmen), San Pedro de Montes de Oca, San Juan de Dios de Desamparados, León XIII en Tibás, San Francisco (Guararí) de Heredia, Quepos del Cantón de Aguirre y el Barrio Cristóbal Colón (Cieneguita) de Limón.