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THE HAGUE

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YEAR 2015

Public sitting

held on Monday 20 April 2015, at 10 a.m., at the Peace Palace,

President Abraham presiding,

*in the cases concerning Construction of a Road in Costa Rica along the San Juan River
(Nicaragua v. Costa Rica); Certain Activities carried out by Nicaragua
in the Border Area (Costa Rica v. Nicaragua)*

VERBATIM RECORD

ANNÉE 2015

Audience publique

tenue le lundi 20 avril 2015, à 10 heures, au Palais de la Paix,

sous la présidence de M. Abraham, président,

*dans les affaires relatives à Construction d'une route au Costa Rica le long du fleuve San Juan
(Nicaragua c. Costa Rica) ; Certaines activités menées par le Nicaragua
dans la région frontalière (Costa Rica c. Nicaragua)*

COMPTE RENDU

Present: President Abraham
 Vice-President Yusuf
 Judges Owada
 Tomka
 Bennouna
 Cançado Trindade
 Greenwood
 Xue
 Donoghue
 Gaja
 Sebutinde
 Bhandari
 Robinson
 Gevorgian
Judges *ad hoc* Guillaume
 Dugard

 Registrar Couvreur

Présents : M. Abraham, président
M. Yusuf, vice-président
MM. Owada
Tomka
Bennouna
Caçado Trindade
Greenwood
Mmes Xue
Donoghue
M. Gaja
Mme Sebutinde
MM. Bhandari
Robinson
Gevorgian, juges
MM. Guillaume
Dugard, juges *ad hoc*

M. Couvreur, greffier

The Government of Nicaragua is represented by:

H.E. Mr. Carlos José Argüello Gómez, Ambassador of the Republic of Nicaragua to the Kingdom of the Netherlands,

as Agent and Counsel;

Mr. Stephen C. McCaffrey, Professor of International Law at the University of the Pacific, McGeorge School of Law, Sacramento, former Member and former Chairman of the International Law Commission,

Mr. Alain Pellet, Professor at the University Paris Ouest, Nanterre-La Défense, former Member and former Chairman of the International Law Commission, member of the Institut de droit international,

Mr. Paul S. Reichler, Attorney-at-Law, Foley Hoag LLP, member of the Bars of the United States Supreme Court and the District of Columbia,

Mr. Andrew B. Loewenstein, Attorney-at-Law, Foley Hoag LLP, member of the Bar of the Commonwealth of Massachusetts,

as Counsel and Advocates;

Mr. César Vega Masís, Deputy Minister for Foreign Affairs, Director of Juridical Affairs, Sovereignty and Territory, Ministry of Foreign Affairs,

Mr. Walner Molina Pérez, Juridical Adviser, Ministry of Foreign Affairs,

Mr. Julio César Saborio, Juridical Adviser, Ministry of Foreign Affairs,

as Counsel;

Mr. Edgardo Sobenes Obregon, Counsellor, Embassy of Nicaragua in the Kingdom of the Netherlands,

Ms Claudia Loza Obregon, First Secretary, Embassy of Nicaragua in the Kingdom of the Netherlands,

Mr. Benjamin Samson, Researcher, Centre de droit international de Nanterre (CEDIN), University of Paris Ouest, Nanterre-La Défense,

Ms Cicely O. Parseghian, Attorney-at-Law, Foley Hoag LLP, member of the Bar of the Commonwealth of Massachusetts,

Mr. Benjamin K. Guthrie, Attorney-at-Law, Foley Hoag LLP, member of the Bar of the Commonwealth of Massachusetts,

Mr. Ofilio J. Mayorga, Attorney-at-Law, Foley Hoag LLP, member of the Bars of the Republic of Nicaragua and New York,

as Assistant Counsel;

Le Gouvernement du Nicaragua est représenté par :

S. Exc. M. Carlos José Argüello Gómez, ambassadeur de la République du Nicaragua auprès du Royaume des Pays-Bas,

comme agent et conseil ;

M. Stephen C. McCaffrey, professeur de droit international à la McGeorge School of Law de l'Université du Pacifique à Sacramento, ancien membre et ancien président de la Commission du droit international,

M. Alain Pellet, professeur à l'Université de Paris Ouest, Nanterre-La Défense, ancien membre et ancien président de la Commission du droit international, membre de l'Institut de droit international,

M. Paul S. Reichler, avocat au cabinet Foley Hoag LLP, membre des barreaux de la Cour suprême des Etats-Unis d'Amérique et du district de Columbia,

M. Andrew B. Loewenstein, avocat au cabinet Foley Hoag LLP, membre du barreau du Commonwealth du Massachusetts,

comme conseils et avocats ;

M. César Vega Masís, ministre adjoint des affaires étrangères, directeur des affaires juridiques, de la souveraineté et du territoire au ministère des affaires étrangères,

M. Walner Molina Pérez, conseiller juridique au ministère des affaires étrangères,

M. Julio César Saborio, conseiller juridique au ministère des affaires étrangères,

comme conseils ;

M. Edgardo Sobenes Obregon, conseiller à l'ambassade du Nicaragua au Royaume des Pays-Bas,

Mme Claudia Loza Obregon, premier secrétaire à l'ambassade du Nicaragua au Royaume des Pays-Bas,

M. Benjamin Samson, chercheur, Centre de droit international de Nanterre (CEDIN), Université de Paris Ouest, Nanterre-La Défense,

Mme Cicely O. Parseghian, avocate au cabinet Foley Hoag LLP, membre du barreau du Commonwealth du Massachusetts,

M. Benjamin K. Guthrie, avocat au cabinet Foley Hoag LLP, membre du barreau du Commonwealth du Massachusetts,

M. Ofilio J. Mayorga, avocat au cabinet Foley Hoag LLP, membre des barreaux de la République du Nicaragua et de New York,

comme conseils adjoints ;

Mr. Danny K. Hagans, Principal Earth Scientist at Pacific Watershed Associates, Inc.,

Mr. Robin Cleverly, Geographical and Technical Consultant,

Ms Blanca P. Ríos Touma, Ph.D., Assistant Professor at Universidad Tecnología Indoamérica in Quito, Ecuador,

Mr. Scott P. Walls, Master of Landscape Architecture — Environmental Planning, Sole Proprietor and Fluvial Geomorphologist at Scott Walls Consulting, Ecohydrologist at cbec ecoengineering, Inc., and Chief Financial Officer and Project Manager at International Watershed Partners,

Ms Victoria Leader, Geographical and Technical Consultant,

as Scientific Advisers and Experts.

The Government of Costa Rica is represented by:

H.E. Mr. Manuel A. González Sanz, Minister for Foreign Affairs and Worship of the Republic of Costa Rica;

H.E. Mr. Edgar Ugalde Álvarez, Ambassador on Special Mission,

as Agent;

H.E. Mr. Sergio Ugalde, Ambassador of Costa Rica to the Kingdom of the Netherlands, Member of the Permanent Court of Arbitration,

as Co-Agent, Counsel and Advocate;

Mr. Marcelo Kohen, Professor of International Law at the Graduate Institute of International and Development Studies, Geneva, member of the Institut de droit international,

Mr. Samuel Wordsworth, Q.C., member of the English Bar, member of the Paris Bar, Essex Court Chambers,

Mr. Arnaldo Brenes, Senior Adviser to the Ministry of Foreign Affairs and Worship, member of the Costa Rican Bar,

Ms Kate Parlett, Solicitor admitted in Queensland, Australia, and in England and Wales,

Ms Katherine Del Mar, member of the English Bar, 4 New Square, Lincoln's Inn,

as Counsel and Advocates;

Mr. Simon Olleson, member of the English Bar, 13 Old Square Chambers,

as Counsel;

M. Danny K. Hagans, spécialiste principal des sciences de la terre de Pacific Watershed Associates, Inc.,

M. Robin Cleverly, consultant dans les domaines géographique et technique,

Mme Blanca P. Ríos Touma, Ph.D., professeur adjoint à l'Universidad Tecnología Indoamérica de Quito (Equateur),

M. Scott P. Walls, titulaire d'une maîtrise en architecture paysagère et en planification de l'environnement, propriétaire unique et géomorphologue fluvial de Scott Walls Consulting, spécialiste en écohydrologie de cbec ecoengineering, Inc., directeur financier et chef de projet pour International Watershed Partners,

Mme Victoria Leader, consultante dans les domaines géographique et technique,

comme conseillers scientifiques et experts.

Le Gouvernement du Costa Rica est représenté par :

S. Exc. M. Manuel A. González Sanz, ministre des affaires étrangères et des cultes de la République du Costa Rica ;

S. Exc. M. Edgar Ugalde Álvarez, ambassadeur en mission spéciale,

comme agent ;

S. Exc. M. Sergio Ugalde, ambassadeur du Costa Rica auprès du Royaume des Pays-Bas, membre de la Cour permanente d'arbitrage,

comme coagent, conseil et avocat ;

M. Marcelo Kohen, professeur de droit international à l'Institut de hautes études internationales et du développement de Genève, membre de l'Institut de droit international,

M. Samuel Wordsworth, Q.C., membre des barreaux d'Angleterre et de Paris, Essex Court Chambers,

M. Arnoldo Brenes, conseiller principal auprès du ministère des affaires étrangères et des cultes, membre du barreau du Costa Rica,

Mme Kate Parlett, solicitor (Queensland (Australie), Angleterre et pays de Galles),

Mme Katherine Del Mar, membre du barreau d'Angleterre, 4 New Square, Lincoln's Inn,

comme conseils et avocats ;

M. Simon Olleson, membre du barreau d'Angleterre, 13 Old Square Chambers,

comme conseil ;

Mr. Ricardo Otarola, Adviser to the Ministry of Foreign Affairs and Worship,

Ms Shara Duncan, Adviser to the Ministry of Foreign Affairs and Worship,

Mr. Gustavo Campos, Minister Counsellor and Consul General of Costa Rica to the Kingdom of the Netherlands,

Mr. Rafael Saenz, Minister Counsellor at the Costa Rican Embassy in the Kingdom of the Netherlands,

Ms Ana Patricia Villalobos, Official at the Ministry of Foreign Affairs and Worship,

as Assistant Counsel;

Ms Elisa Rivero, Administrative Assistant at the Ministry of Foreign Affairs and Worship,

as Assistant.

M. Ricardo Otarola, conseiller auprès du ministère des affaires étrangères et des cultes,

Mme Shara Duncan, conseillère auprès du ministère des affaires étrangères et des cultes,

M. Gustavo Campos, ministre-conseiller et consul général du Costa Rica auprès du Royaume des Pays-Bas,

M. Rafael Saenz, ministre-conseiller à l'ambassade du Costa Rica au Royaume des Pays-Bas,

Mme Ana Patricia Villalobos, fonctionnaire du ministère des affaires étrangères et des cultes,
comme conseils adjoints ;

Mme Elisa Rivero, assistante administrative au ministère des affaires étrangères et des cultes,
comme assistante.

Le PRESIDENT : Veuillez vous asseoir. L'audience est ouverte.

La Cour se réunit aujourd'hui pour entendre les plaidoiries des Parties sur le fond de l'affaire relative à la *Construction d'une route au Costa Rica le long du fleuve San Juan (Nicaragua c. Costa Rica)*. Chaque Partie disposera de trois séances de trois heures pour le premier tour et d'une séance de trois heures pour le second. Il s'agit bien évidemment d'un temps de parole maximal, que les Parties ne devront utiliser qu'en tant que de besoin. Le premier tour de plaidoiries débute aujourd'hui et se terminera le vendredi 24 avril 2015. Les experts du Nicaragua seront entendus ce matin et cet après-midi ; ceux du Costa Rica le seront vendredi 24. Le second tour des plaidoiries dans cette affaire s'ouvrira le 30 avril et s'achèvera le 1^{er} mai.

Le Nicaragua, qui est l'Etat demandeur en l'affaire, sera entendu le premier. Je donne à présent la parole à Son Excellence M. Argüello Gómez, agent du Nicaragua. Excellence, vous avez la parole.

Mr. ARGÜELLO-GÓMEZ: Thank you, Mr. President. Mr. President, Members of the Court, good morning.

1. I will not spend too much of your time explaining how this case came about and on most of the usual introductory remarks of an Agent in his opening speech. The joined cases we are arguing before you during these weeks are well known to the great majority of the Members of the Court and we have just finished the first round of oral pleadings in one of the joined cases. Besides, at bottom this case hangs on technical and scientific questions and it is preferable to leave all time possible for the experts to speak for themselves or for counsel to explain the experts' conclusions.

2. Mr. President, these cases were joined at the request of Nicaragua that argued¹ not only that both cases involved the same Parties and were tightly connected both in law and in fact and, that since Costa Rica justified the construction of the road on the situation under review in the *Certain Activities* case, it seemed logical that they be decided together.

¹Written Observations of Nicaragua on the Admissibility of its Counter-Claims, 30 Jan. 2013.

3. Costa Rica has attempted to justify the unplanned construction of a disastrous road by passing an “Emergency Decree.” This Decree was published and came into force on 7 March 2011², exactly one day prior to the reading of the Court’s Order on provisional measures requested by Costa Rica. It is evident that Costa Rica rushed³ to draft and approve this Decree before the Court could issue its Order, otherwise it would not have been able to justify the reasons for the emergency since the main justification was described as being the fact that “to this day Nicaragua continues to occupy and damage a part of the Costa Rican territory with the presence of the Nicaraguan armed forces, in particular, in Isla Portillo-Isla Calero”⁴.

4. The Members of Court represent the principal legal systems of the world. I am certain that all those legal systems provide for the declaration of states of emergency, but that all of them have the underlying understanding that first there should be a real emergency. Non-governmental organizations (NGOs) in Costa Rica itself have denied that there was an “emergency” sufficient to justify the unplanned construction of a road through an environmentally sensitive area. In an article published on 4 June 2014, Alberto Cabezas, the founder of the NGO *Fundación Mundial Déjame Vivir en Paz*, said of the road project:

“It is our opinion that no emergency, except cases where human life is in danger (which is *not* the case) justifies nowadays, an environmental risk such as the one posed by this project as a consequence of not having conducted necessary studies to prevent processes that at this point, are very difficult and costly to correct.”⁵

5. Costa Rica’s own expert institutions on environment and road construction agree that the road was not planned, and that it was not designed or constructed properly.

6. Costa Rica’s own national professional association of engineers and architects, CFIA, came to this conclusion in a June 2012 report⁶. The CFIA found that Costa Rica undertook the project “without a single plan to indicate the path that was to be opened, or what its characteristics

²Official Daily Gazette No.46, Decree No.36440-MP, Year CXXXIII, La Uruca, San José, Costa Rica, 7 Mar. 2011; Memorial of Nicaragua (MN), Vol. II, Ann. 11.

³On 18 Feb. 2011, the Registrar notified the Parties that the Order of the Court on the request for the indication of provisional measures presented by Costa Rica would be read in open Court on 8 Mar. 2011; ref: 1380066.

⁴Provision VI, Official Daily Gazette No.46, Decree No.36440-MP, Year CXXXIII, La Uruca, San José, Costa Rica, 7 March 2011; MN, Vol. II, Ann. 11.

⁵Alberto Cabezas, Border Trail Case, published 4 June 201, Revista Amauta; Reply of Nicaragua (RN), Vol. II, Ann. 22; emphasis added.

⁶Federated Association of Engineers and Architects of Costa Rica (CFIA), “Report on Inspection of the Border Road, Northern Area Parallel to the San Juan River”, 8 June 2012; MN, Vol. II, Ann. 4, p. 257.

should have been”⁷. We now know that the CFIA was prophetic in concluding that constructing a road in this way will inevitably “cause increased costs, environmental problems, and a rapid deterioration of the project”⁸.

7. The National Laboratory of the University of Costa Rica (“LANAMME” by its Spanish acronym) concluded that

“the project failed to follow basic engineering practices during planning and implementation, such as: land survey for road layout; critical point geotechnical assessment; drainage structure location, design, and construction; defining suitable and uniform technical standards; [and proper] inspection . . .”⁹.

8. The President of Costa Rica also agrees that the road is a disaster. The following news item is taken from the *Tico Times*¹⁰:

“Costa Rican President Luis Guillermo Solís on Friday (20 May 2014) visited the isolated and impoverished border area in northern Costa Rica, the site of a troubled road project plagued by scandals and initiated by the previous administration of Laura Chinchilla (2010-2014). Solís said he was surprised by the lack of progress on Route 1856, a 160-kilometer road parallel to the San Juan River, a natural border between Costa Rica and Nicaragua:

[Mr. Solís said]

‘They left me a mess,’ Solís said in an interview with the daily *La Nación*, referring to the Chinchilla administration. Solís was accompanied on the one-day trip by William Loría, transportation and infrastructure coordinator at the National Structural Materials and Models Laboratory (LANAMME). [...]

Following an on-the-ground inspection, Mr. Loría said, [he is quoted in the article] ‘Only 20 kilometers of the road are well constructed.’”

9. I need only remind the Court that the road spans a total of 160 km. According to Mr. Loría only 20 km of the road were well constructed.

⁷Federated Association of Engineers and Architects of Costa Rica (CFIA), “Report on Inspection of the Border Road, Northern Area Parallel to the San Juan River”, 8 June 2012; MN, Vol. II, Ann. 4, p. 25, para. 5.3.

⁸*Ibid.*

⁹Laboratorio Nacional de Materiales y Modelos Estructurales, “Report on Reconnaissance Trip to Route 1856 — Juan Rafael Mora Porras Border Trail”, pp. 50-51; MN, Vol. II, Ann. 3.

¹⁰“Solís visits scandal-plagued border road, vows to clean up predecessor’s mess”, *Tico Times*, 26 May 2014 available at <http://www.ticotimes.net/2014/05/26/solis-visits-scandal-plagued-border-road-vows-to-clean-up-predecessors-mess>.

10. Nicaragua has asked the advice and assistance of some of the most distinguished experts on the different questions raised by the construction of this road. Nicaragua has filed their reports¹¹ and summary¹² reports and the Court will listen to some of them in today's hearings.

11. To put it into perspective, the issues involved in this *Road* case with those of its joined case of the *Certain Activities*, [tab 1 on] please note on the screen the map that has been prepared at the Court's request for the indication of the key locations along the road being constructed by Costa Rica. The *caño* of Costa Rica's discontent is this minute line — the whole disputed area is that shown in green at the mouth. The road is the long red line running from the delta where the Colorado branches out to the vicinity of where the San Juan leaves the Great Lake of Nicaragua.

12. In that little area of the *caño*, damage — if any and if Costa Rica had a right to claim for it — well damage is small and nature itself has repaired it as recognized by Professor Thorne¹³.

13. On the other hand, the large extension of work along this route, that after more than four years has produced general disaster everywhere along its path, is still producing direct damage to the San Juan River and continues to be a sword hanging over the life of the river awaiting a strong storm or hurricane or earthquake to destroy the river¹⁴. [Tab 1 off]

14. But there is even a more certain and imminent threat to the River and the life it sustains. Costa Rica's own experts concede that, as a result of the erosion caused by haphazard and irresponsible construction of the road, including in very close proximity to the river bank, at least 75,000 tons of sediment have poured into the river every year since construction began in 2011¹⁵. Nicaragua's experts calculate the amount of sediment contributed by the road to the river at 240,000 tons annually¹⁶. At least 20 per cent of this sediment is transferred to the Lower San Juan

¹¹See for example G. Mathias Kondolf, Danny Hagans, Bill Weaver and Eileen Weppner: "Environmental Impacts of Juan Rafael Mora Porras Route 1856, Costa Rica, on the Río San Juan, Nicaragua", Dec. 2012; MN, Vol. II, Ann. 1.

¹²Written Statement of Professor G. Mathias Kondolf, Ph.D., 16 Mar. 2015; Written Statement of Dr. William R. Sheate, 15 Mar. 2015; Written Statement of William E. Weaver, Ph.D., 15 Mar. 2015; Written Statement of Emeritus Professor Edmund D. Andrews, Ph.D., March 15, 2015.

¹³CR 2015/3, p.32 (Thorne).

¹⁴RN, paras. 3.47-3.58.

¹⁵Written Statement of Colin Thorne, March 2015, p. 6, para. 3.2.

¹⁶Dr. Edmund D. Andrews, "An Evaluation of the Methods, Calculations, and Conclusions Provided by Costa Rica Regarding the Yield and Transport of Sediment in the Rio San Juan Basin", July 2014; RN, Vol II. Ann. 3, p. 2.

River, where it accumulates and enlarges shoals and sandbars that already constitute major impediments to navigation¹⁷. As Professor Thorne told you last week, the silting up of the river is so far advanced that navigation is not possible in the dry season¹⁸. As Costa Rica's expert also told you, maintaining the flow of fresh water to the wetlands downstream, including the area in dispute in the *Certain Activities* case, is vital to their environmental well-being¹⁹.

15. That is why Nicaragua, at great expense, has been dredging the Lower San Juan River for the past four years. To keep the river alive. To keep it from drying up. To assure that the small boats used by the local inhabitants and traders can continue to navigate year round, and to keep the fresh water supply for the wetlands from diminishing.

16. This is the sensitive environment in which Costa Rica has irresponsibly, and without regard to the consequences, chosen to build a road that only serves to exacerbate the sedimentation problem in the Lower San Juan, hasten the river's demise, and force Nicaragua to expend even more of its scarce resources to dredge even greater quantities of sediment from the river.

17. Mr. Reichler and I expect the experts you will hear this morning, will have more to say on this subject.

18. Mr. President, the following is our order of presentation in the first round.

19. Mr. Reichler will first address you this morning on the evidence concerning the road constructed by Costa Rica, including the manner in which it was conceived and constructed, the many problems with its construction that have caused, and continue to cause, hundreds of thousands of tons of sediment to be delivered to the San Juan River, and the inadequacy of the remediation efforts undertaken by Costa Rica. After Mr. Reichler, Nicaragua will present its experts, in the following order: Dr. William Weaver, Professor Mathias Kondolf, Dr. Edmund Andrews and Dr. William Sheate.

20. Tomorrow morning, Mr. Reichler will address you on the evidence showing that Costa Rica's construction of the road has caused significant harm to Nicaragua, especially by exacerbating the problem of excessive accumulation of sediment in the Lower San Juan River,

¹⁷Written Statement of Colin Thorne, March 2015, p.14, para. 4.3.

¹⁸CR 2015/3, p. 25 (Thorne).

¹⁹*Ibid.*, p. 41 (Thorne).

adding to the existing obstacles to navigation, and further reducing the flow of fresh water to the internationally important wetlands downstream. Mr. Loewenstein will then discuss the evidence relating to the risk of harm to the ecology of the San Juan River resulting from the construction of the road.

21. Following Mr. Loewenstein, Professor McCaffrey will address you on Costa Rica's violations of its obligations under international environmental law that the evidence discussed by Mr. Reichler and Mr. Loewenstein has established, and finally, Professor Pellet will conclude Nicaragua's first round with his discussion of the remedies to which Nicaragua is entitled, and which it has requested in these proceedings.

22. This ends my presentation, Mr. President, Members of the Court. Mr. President, I ask if you will please now give the floor to Mr. Reichler.

Le PRESIDENT : Merci, Monsieur l'ambassadeur. Je donne la parole à M. Reichler.

Mr. REICHLER:

THE EVIDENCE: PART ONE

THE ROAD

1. Mr. President, Members of the Court, good morning! I hope all of you had an enjoyable weekend in sunny Holland. It is my role to discuss the evidence supporting Nicaragua's case. I will do so in two parts. This morning I will address the construction of the road itself. Tomorrow morning, in part two, I will discuss the harm that this has caused to Nicaragua. The fundamental conclusions to be drawn from the evidence are these. One, Costa Rica's construction of the road, alongside the San Juan River, in the manner it was designed and built, has caused significant harm to Nicaragua by depositing, and continuing to deposit, many hundreds of thousands of tons of sediment into the river. Two, the river is already so overburdened by sediment that, as you heard last week, the Lower San Juan cannot accommodate even its pre-road sediment load, which accumulates on the river bottom, and especially at shoals and sandbars, obstructing navigation and diminishing the flow of fresh water to the wetlands downstream that depend on it for their ecological balance. Three, constant dredging is required to keep the Lower San Juan navigable,

and to maintain a sufficient supply of fresh water to the wetlands. Four, as Nicaragua keeps dredging sediment out of the river to accomplish these sovereign and legitimate objectives, Costa Rica's road keeps pouring it in, adding to Nicaragua's dredging burden. That, in Nicaragua's view, is significant harm. It is not only that. It is measurable, it is quantifiable and it is compensable. And it is ongoing. In fact, it keeps getting worse with the passage of time. Nicaragua seeks not only compensation for the harm done to date, but an Order sufficient to prevent ongoing and future harm from occurring.

2. Costa Rica's case is this. They admit that the road was poorly conceived, inappropriately situated, improperly designed and badly constructed, such that it has required, and continues to require, major repair and remediation. And they admit that it causes massive amounts of sediment to be deposited in the river. They admit to at least 75,000 tons of sediment per year²⁰, which in the four and a third years that have elapsed since construction began, amounts to 325,000 tons. We say the number is much higher, more than 1 million tons²¹, but even if, *quod non*, Costa Rica has correctly calculated the amount of sediment that they have caused to be deposited in Nicaragua's river, that is enough to establish significant harm, because it adds substantially to the amount of sediment Nicaragua is already required to dredge out, in order to keep the waters of the Lower San Juan flowing.

3. And this is where the Parties disagree. It is really the only fundamental point on which disagreement exists. They say that the river is already so overburdened with sediment that adding another 325,000 tons of it, and counting, makes no difference. At the hearing on Nicaragua's request for provisional measures in November 2013, Costa Rica referred to this amount of sediment as "trivial"²². They say that it represents no more than a 1 or 2 per cent addition to the overall volume of sediment in the river, and therefore is barely discernible²³.

4. In effect, Mr. President, Costa Rica argues that the river is already drying up and dying from too much sediment. So, if it is going to die anyway, what difference does it make if we

²⁰Rejoinder of Costa Rica (RCR), para. 2.61.

²¹See Reply of Nicaragua (RN), para. 2.4 (estimating a contribution of 150,000 m³, or over 250,000 tons, per year).

²²CR 2013/29, p. 10, para. 10 (Ugalde Álvarez).

²³RCR, paras. 2.64-65, 2.80.

hasten its death by adding a few hundred thousand tons more. They cannot be right about that. First of all, the victim here is Nicaragua's river, over which Nicaragua alone exercises *sumo imperium*. It is certainly not Costa Rica's right to hasten the river's death, even if Costa Rica considers it inevitable. Second, even if, *quod non*, the river is dying, the longer its life can be prolonged, the longer riparian inhabitants and commercial users will be able to navigate it, and the longer internationally protected wetlands will continue to be fed by its life-giving waters and nutrients. As you heard last week, those are the purposes of Nicaragua's dredging programme²⁴. And finally, Nicaragua does not accept the inevitability of the river's death. In geologic time, that fate may be sealed, as Professors Thorne and van Rhee have told us²⁵. But geologic time is measured in millennia, and in the meantime, and for the future as far as any of us can see it, the river is still very much alive. If its health is poor, that is no justification for deliberately, or even negligently, making it sicker than it already is, and making Nicaragua administer even more curative treatment than it is already providing.

5. Mr. President, after voluminous written pleadings, numerous reports from the technical experts, and the testimony from both Parties' experts last week, there are now many factual issues on which the Parties agree; this should ease the burden on the Court; by narrowing the area of disagreement, the Court is free to focus its attention there.

6. For example, it is now undisputed that the road was constructed haphazardly and in great haste, without prior design or engineering studies, without analysis of the suitability of the site, and without taking into account any possible impacts to the San Juan River. In regard to the latter, Costa Rica accepts that it did not prepare a prior Environmental Impact Assessment of the harms and risks even to its own territory, let alone the harms and risks to Nicaragua's river.

7. The particular, the facts about the construction of the road are now well established, and Costa Rica does not deny them. Indeed, Costa Rica expressly accepts that, because of its failures of design, engineering and construction, major rebuilding, repair and other remediation efforts have been required, but in most cases have not yet been performed. More than four years after

²⁴CR 2015/6, pp. 10-13, paras. 3-13 (Reichler).

²⁵Thorne Summary Report for *Certain Activities* case, Mar. 2015, p. 2, para. 2.4; Van Rhee Summary Report, 15 Mar. 2015, p. 2, para. 5.

construction began, in what Costa Rica then described as emergency circumstances, much of the road is still unfinished, and much of what has been built is in disrepair, requiring extensive rebuilding. In their Rejoinder, they acknowledge that of the 120 places where the road crosses streams that feed directly into the San Juan, at least 82 of those crossings have required remediation; and that, as of February of this year, at least 54 water crossings, more than 65 per cent, were still not remediated, and are continuing to contribute sediment into the river²⁶. Costa Rica's report card is just as bad for the portions of the road built on steep hillsides or slopes, unsuitable for the construction of a road of this nature. There were 201 such sites, of which 190 were determined by Costa Rica to require remediation, and, as of two months ago, 165 of them, or 86 per cent, were still not remediated, and were still spewing sediment into the river²⁷. And that is by Costa Rica's own count. Professor Thorne, Costa Rica's expert, accepts the accuracy of these figures²⁸.

8. Mr. President, at the conclusion of my speech, Nicaragua will tender Dr. William Weaver as its witness. Dr. Weaver has more than 35 years of professional experience in the fields of surface water hydrology, watershed management and engineering geology. For 13 years he was principal Engineering Geologist at Redwood National Park in California, responsible for designing and monitoring an internationally recognized watershed rehabilitation and erosion control programme. His expertise lies particularly in the impacts of road construction on watershed erosion and sedimentation processes, and the design and control of road-related construction in steep, forested environments and watersheds²⁹. In addition to his summary report, Dr. Weaver has co-authored two other reports providing expert evidence on the faulty design and construction of the road, its failures in many critical locations, the lack or inadequacy of Costa Rica's remediation

²⁶See Andreas Mende, "Inventory of Slopes and Water Courses related to the Border Road No. 1856 between Mojón II and Delta Costa Rica: Second Report", Dec. 2014 (hereinafter "2014 Mende Inventory"); RCR, Vol. II, Ann. 3, p. 29, table 5, judges' folder, tab 3, p. 6.

²⁷See 2014 Mende Inventory, RCR, Vol. II, Ann. 3, p. 30, table 7; judges' folder, tab 4, p. 2.

²⁸Thorne, "Assessment of the Impact of the Construction of the Border Road in Costa Rica on the San Juan River: Reply Report", Feb. 2015, App. A to RCR (hereinafter "Thorne (2015)"), pp. 137-138, tables 7.4-7.5; judges' folder, tab 6.

²⁹Weaver Summary Report, 15 March 2015, para. 1.

efforts, and the erosion from failing portions of the road that have resulted in massive, yet avoidable, sediment delivery to the San Juan River³⁰.

9. Surprisingly, or perhaps not so surprisingly, Costa Rica has indicated that it will not exercise its right to cross-examine Dr. Weaver. What this means is that Dr. Weaver's evidence, summarized in his expert report of 16 March 2015, will go unchallenged today. This may be because Costa Rica wants to avoid calling attention to what he has to say. Nicaragua trusts that Costa Rica's effort to ignore Dr. Weaver's evidence will not have its desired effect. Although Costa Rica is entitled to decline examining Dr. Weaver, this, of course, does not bar the Court from questioning him, if it is inclined to do so. And it certainly does not prevent the Court from reading his reports.

10. Mr. President, I trust it will be helpful to the Court for me to identify now those specific subjects on which the Parties agree. There are seven subjects of agreement, or at least where, as I will show, the facts are no longer disputed. Every fact I will recite is well established in the case record. The sources will be footnoted in the transcript.

11. The first point of agreement is that prior to commencement of construction, there were no studies of the appropriateness of the siting of the road along steep terrain and in close proximity to the river, and there were no prior studies of road design, engineering or construction, and that this lack of advance planning led to major problems, including the erosion of many thousands of tons of sediment into the San Juan River. Costa Rica's Association of Federated Engineers and Architects reported: "The route was constructed without a single plan to indicate the path that was to be opened, or what its characteristics should have been."³¹ CONAVI, the Costa Rican Government's agency responsible for public roads, within its Ministry of Public Works, reported that "it should be understood that the work of starting the trail could not be subjected to the

³⁰Kondolf, Hagans, Weaver and Weppner, "Environmental Impacts of Juan Rafael Mora Porras Route 1856, Costa Rica, on the Río San Juan, Nicaragua", Dec. 2012, Memorial of Nicaragua (MN), Ann. 1; Hagans and Weaver, "Evaluation of Erosion, Environmental Impacts and Road Repair Efforts at Selected Sites along Juan Rafael Mora Route 1856 in Costa Rica, Adjacent to the Río San Juan, Nicaragua", July 2014; RN, Ann. 2.

³¹CFIA, "Report on Inspection of the Border Road, Northern Area Parallel to the San Juan River," 8 June 2012, MN, Ann. 4, p. 25, para. 5.3.

procedures for development of infrastructure projects that take into account, for example, stages of conceptualization, feasibility, design and management of the work”³².

12. As Dr. Weaver explained in his summary report,

“Failure to plan . . . resulted in excessive and disorganized earthmoving works. Contractors began constructing the Road in one location, only to abandon that stretch and build the Road elsewhere, locally doubling or even tripling the amount of terrain left de-vegetated, disturbed, exposed and eroding. Lack of planning also allowed the Road to be built across steep slopes and areas of weak, unstable soils. Over 30 km of the Road has been built across steep hillslopes, many composed of deeply weathered, unconsolidated, or otherwise weak material that is prone to erosion and slope failure.”³³

Further,

“Inadequate planning resulted in construction of the Road inappropriately close to the Río San Juan in many areas. . . . 17.9 km of Route 1856 encroaches into the 50 meter setback required by Costa Rican law, with some sections within as little as five meters of the River. [This] . . . almost assured that construction and use of the Road would deliver sediment and other pollutants to the River.”³⁴

13. As Dr. Weaver points out:

“There is no technical or environmental reason for the Road to be located where it was built. Better sites with more stable ground, located at greater distance from the River, would have resulted in far less environmental impact and over the long run, far less expense in attempting to maintain a poorly-sited, poorly-constructed road.”³⁵

Costa Rica has provided no answer to this. It has failed to explain why it was necessary or appropriate for the road to be built where it was. Indeed, its own belated Environmental Diagnostic Assessment, produced in November 2013, three years after road construction began, recommended that key sections of the road where erosion into the river was worst, should be relocated farther inland, away from the River³⁶. This has not been done.

14. The second point of agreement is that no Environmental Impact Assessment was conducted, and no effort was made to assess impacts on the San Juan River, before construction commenced. The University of Costa Rica’s Environmental Law experts concluded that:

³²CONAVI, Press Release, 25 May 2012; MN, Ann. 34, para. 3.

³³Weaver Summary Report, 15 March 2015, paras. 4-5.

³⁴*Ibid.*, para. 6.

³⁵*Ibid.*, para. 7.

³⁶Centro Científico Tropical, “Environmental Diagnostic Assessment (EDA), Route 1856 Project - Ecological Component”, Nov. 2013, Counter-Memorial of Costa Rica (CMCR), Vol. II, Ann. 10, p. 147; see also Centro Científico Tropical, “Follow-up and Monitoring Study Route 1856 Project - EDA Ecological Component”, Jan. 2015, RCR, Vol. III, Ann. 14, p. 57.

“Practically there is not a single one of our environmental laws that wasn’t violated: the national rules in relation to prior studies were entirely violated, the need to present mitigation measures, a management plan, the prohibition on cutting certain species of trees, respecting protected areas, all of these delicts being duly proscribed by our penal law.”³⁷

This is at tab 2 of your judges’ folder, second page. Dr. William Sheate, an expert on EIA, has supplied two reports on Costa Rica’s failure in this regard, including his summary report of 16 March 2015³⁸. He will appear for examination by Costa Rica and the Court this afternoon.

15. Without prior planning or environmental assessment, it is not surprising that the road was constructed in a disorderly fashion that violated basic siting, design, engineering and construction standards, and caused environmental harm. And this is the third point of agreement between the Parties: that the road was poorly and hastily constructed in violation of technical and environmental standards, and that, as a result, it disintegrated in hundreds of locations, crumbling away or washing out where it crossed over watercourses, and collapsing in many places where it traversed steep hillsides and where it never should have been built in the first place, or at least should have followed proper engineering standards. I will review, and show you, some of these specific failures of the road, and their impacts on the San Juan River, in the course of this presentation.

16. The fourth point of agreement is that both the basic construction of the road — involving the bulldozing of forests and massive quantities of earth in very close proximity to the River — and the poor quality of the works, have already resulted in the delivery of hundreds of thousands of tons of sediments into the River, both directly and by steady and ongoing erosion. In its Counter-Memorial, Costa Rica admitted that it had caused more than 60,000 thousand tons of sediment to enter the river each year³⁹. After Nicaragua’s Reply pointed out some of the flaws in Costa Rica’s calculations⁴⁰, which were admitted in the Rejoinder, Costa Rica went back to its witches’ brew of statistical analyses — stirred the pot a bit, said a few magic words — and upped

³⁷Gerardo Quesada, “Complaints regarding construction without permit at the edge of the Road”, *San Carlos Al Día*, Costa Rica, 12 Jun. 2013, available at <http://www.sancarlosaldia.com/noticias/notas-generales/denuncian-construccion-sin-permiso-a-la-orilla-de-la-trocha.html> (last accessed 19 Apr. 2015), translation provided at judges’ folder tab 2.

³⁸Sheate Summary Report, 15 March 2015; Sheate, “Comments on the lack of EIA for the San Juan Border Road in Costa Rica”, July 2014, RN, Vol. II, Ann. 5.

³⁹CMCR, paras. 3.25-26.

⁴⁰RN, paras. 2.98-119.

the damage to 75,000 thousand tons annually⁴¹. That adds up to 325,000 tons since construction commenced. Nicaragua submits that the evidence shows this is about one-third of the actual amount, but even so, Costa Rica's own numbers are huge. There is thus no disagreement that — on Costa Rica's own evidence — construction of the road has contributed, and continues to contribute, enormous quantities of sediment into Nicaragua's River.

17. The fifth point of agreement is that the road is in such a poor state that massive remedial works are required, both to make it functional and to mitigate its impacts on the San Juan River and the surrounding environment. Costa Rica admitted this at the oral hearings on provisional measures in November 2013, where they presented to the Court a list of specific remediation actions that were planned, and assured the Court that provisional measures were not necessary because these actions would be sufficient to fully address all of the problems with the road⁴². But, in fact, they were not. A year and a half after these promises were made to the Court, Costa Rica reported, in its Rejoinder, that remediation had been completed at only 35 per cent of the 82 water-crossing sites where Costa Rica itself concluded it was required⁴³, and at only 14 per cent of the 190 slopes where Costa Rica determined that remediation was also required⁴⁴, as at the end of last year. Visual inspection by Nicaragua's experts in late February and early March of this year — recorded in their photographs, which are now part of the case file — show that Costa Rica's mitigation efforts at the small fraction of troubled sites that were allegedly remediated had already failed or were prone to failure, and that there was little or no sign of activity at the other 65 per cent of water-crossings or 86 per cent of slopes where Costa Rica has now admitted, contrary to what it told the Court in November 2013, that remediation is still required, and where erosion of sediments into the River continues unabated⁴⁵.

18. The sixth point of agreement is one that is by now familiar to the Court, and that I need not dwell on: it is that the Lower San Juan River is unable to transport and discharge into the sea the high volumes of sediment it receives from the Upper San Juan. The result is that the coarse

⁴¹CMCR, para. 2.61.

⁴²CR 2013/29, 6 Nov. 2013, p. 50, para. 26 & p. 52, para. 31 (Kohen).

⁴³2014 Mende Inventory, RCR, Vol. II, Ann. 3, p. 29, Table 5; judges' folder, tab 3, p. 6.

⁴⁴*Ibid.*, p. 30, Table 7; judges' folder, tab 4, p. 2.

⁴⁵Weaver Summary Report, 15 Mar. 2015, paras. 21, 49, 50.

sediment, mostly sand, settles mainly along the first 3 km after the bifurcation, especially on sandbars and shoals where water flow is slower and depths are lower. This feeds and enlarges the existing obstacles to navigation and reduces the depths of the river still further, which diminishes the flow rate even further, which, in turn causes even more sediment to settle on more and larger sandbars and shoals, reinitiating the vicious cycle that perpetually adds sediment to the river and continually reduces the size and depth of the navigable channel. This is all confirmed by Professor Thorne.

19. The seventh point of agreement is also a familiar one: to maintain the navigability of the river, both at the stretch within 3 km of the bifurcation, and closer to the mouth, the dredging and removal of huge volumes of sediment is required on a continual basis, year after year, to enable even small boats with draughts of a mere 1 m to navigate without hitting bottom or getting stranded on the many sandbars and shoals that accumulated sediment has created. Indeed, as Professor Thorne stated, the Lower San Juan is not navigable in the dry season⁴⁶, and *constant* dredging of sediments, even in amounts greater than Nicaragua is currently removing from the river, is necessary to keep even a small navigable channel open⁴⁷. And, as both Professor Thorne and Professor van Rhee agree, repeated dredging is also important to maintain a sufficient flow of fresh water to the environmentally-protected wetlands on both sides of the river⁴⁸.

20. Mr. President, the major problems with the road, which have caused it to crumble, collapse or wash out in many places — all resulting in the delivery of vast quantities of sediment to the San Juan River — fall into at least three general categories:

- (i) improper or faulty construction of watercourse crossings;
- (ii) inadequate and insecure construction on slopes; and
- (iii) improper drainage systems.

⁴⁶CR 2015/3, p. 25 (Thorne cross-examination).

⁴⁷Thorne, “Report: Assessment of the physical impact of works carried out by Nicaragua since October 2010 on the geomorphology, hydrology and sediment dynamics of the San Juan River and the environmental impacts on Costa Rican territory”, Oct. 2011; Memorial of Costa Rica (MCR) in the *Certain Activities* case, App. 1, p. II-28.

⁴⁸Van Rhee Summary Report, 15 Mar. 2015, paras. 10-11.

I will review with you the expert testimony, the visual evidence — in the form of photographs and satellite imagery — and the admissions by Costa Rica, in regard to each of these three major problems.

21. I will begin with major problem (1): failed or failing watercourse crossings. As Dr. Weaver explains: “[W]atercourse crossings are some of the most environmentally vulnerable locations along the Road When a crossing erodes or fails, the stream transports the resulting eroded sediment directly to the River.”⁴⁹ Dr. Andreas Mende, Costa Rica’s national expert, whom it did not choose to call as a witness in these hearings, reports that there are at least 127 streams crossed by the road⁵⁰. According to Dr. Mende, as of 2013 only ten of the stream crossings at which construction was attempted were in what he called “appropriate” condition⁵¹.

22. Dr. Weaver explains why:

“Most of the stream crossings were built by filling [the] streambed with earth ([or] fill), with a culvert placed inside the fill through which the streamflow is intended to pass. These crossings are cheaper than bridges, but are inherently unstable and prone to erosion, especially when improperly built, as is the case for many crossings along the Road.”⁵²

Costa Rica’s own forestry agency, CODEFORSA, confirms this:

“Another factor that is causing soil loss is the watercourses that cross [road] 1856. In most of these sites small culverts were placed, which in some cases became obstructed with branches and trunks, leading to the formation of blockages which due to the amount of rain destroyed the passage built and culverts placed. The most troubling is the carrying of material to the river bank, causing the direct contamination of both the creek and the river at its mouth and downstream.”⁵³

23. Nicaragua’s experts reported in 2012, based on their own visual inspection, that in some places “contractors did not even use culverts at all, but instead used *ad hoc* materials such as repurposed shipping containers and logs. Use of these materials is not acceptable under common design standards, and such crossings have already failed or show signs of failure.”⁵⁴ Costa Rica’s

⁴⁹Weaver Summary Report, 15 Mar. 2015, para. 9.

⁵⁰2014 Mende Inventory, RCR, Vol. II, Ann. 3, p. 29, table 5; judges’ folder tab 3, p. 6.

⁵¹Andreas Mende and Allan Astorga, “Inventory of Slopes and Water Courses related to the Border Road No. 1856 between Mojón II and Delta Costa Rica”, Oct. 2013; CMCR, Vol. II, Ann. 6, p. 28, table 4.

⁵²Weaver Summary Report, 15 Mar. 2015, para. 10.

⁵³CODEFORSA, “Restoration and rehabilitation of ecosystems affected by the construction of the Juan Rafael Mora Porras border road, Route 1856: Quarterly Report”, Nov. 2014; RCR, Vol. III, Ann. 12 (hereinafter “CODEFORSA Quarterly Report”), p. 8.

⁵⁴Weaver Summary Report, 15 Mar. 2015, para. 12.

own LANAMME, the National Laboratory of the University of Costa Rica, agreed, also citing “[n]onexistent culvert crossings, which have been provisionally replaced by logs in some places”, and the frequent “[u]se of non-conventional drainage structures — containers — that are deformed and under risk of collapsing”⁵⁵.

24. In their 2012 field assessment of 60 stream crossings, visible from a helicopter or the river, Nicaragua’s experts observed:

“Nearly all exhibited one or more . . . serious design and/or construction deficiencies . . . making them likely to fail during intense rains or flood flows. At virtually all the crossings, some volume of sediment had been introduced directly to the receiving tributary stream and to the Río San Juan during and immediately following construction. Most of the crossings posed a moderate to high risk of failure due to poor design or construction, and still do.”⁵⁶

25. When Nicaragua’s experts returned to inspect the road in May 2014, six months after the oral hearings at which Costa Rica promised remediation, they found little improvement.

“As predicted, the many poorly constructed stream crossings had begun to fail. At the failing sites, there was a nearly total lack of erosion control efforts or maintenance in the preceding two years . . . Even where attempted, they were inadequate; most were superficial measures designed to limit surface erosion, rather than to fix the instability and fundamental defects at the crossings.”⁵⁷

26. Mr. President, you and the Members of the Court, can see for yourselves the problems associated with Costa Rica’s defective watercourse crossings at tab 3 in your judges’ folder today. The first page — tab 3, page 1 — is from Dr. Weaver’s summary report; it shows a typical culverted fill crossing, with the stream passing through the culvert. This is how it is supposed to be done. The next item — at tab 3, page 2 — is a photograph that depicts a failed crossing, built from a shipping container — decomposing — which is located, as you can see, very close to the San Juan River and discharging sediment into it. The next page — tab 3, page 3 — is a satellite image of three severely eroding sites in close proximity to the river, denoted by Nicaragua’s experts with the letters SES, for “Severely Eroding Sites”. All three are failed stream crossings. You can see that they have caved in. As Dr. Weaver observes: these crossings “have already failed and delivered massive amounts of sediment to the River, before being rebuilt in the same manner that

⁵⁵LANAMME, “Report INF-PITRA-014-12: Report from Inspection of Route 1856 — Juan Mora Porras Border Road”, May 2012; MN, Ann. 3 (hereinafter “2012 LANAMME Report”), p. 49.

⁵⁶Weaver Summary Report, 15 Mar. 2015, para. 13.

⁵⁷*Ibid.*, para. 15.

caused them to fail in the first instance”⁵⁸. The next photo — at tab 3, page 4 — is a close-up of one of these failed crossings as of 1 March 2015. You can see the sediment delta at the river bank resulting from erosion at the crossing. The next pair of photos — at tab 3, page 5 — are before and after images of another failed water crossing. These photos are from Dr. Mende’s 2014 report.

27. Mr. President, time, and I am sure your patience, as well, will not allow me to show you photos of every failed or failing watercourse crossing that contributes sediment into the river. So I can only refer you to a few examples.

28. What is Costa Rica’s response? It is supplied in an annex to the Rejoinder, which is a study conducted by its expert, Dr. Mende, prepared in December 2014, just a few months ago. Dr. Mende’s study concludes that the road traversed a total of 127 water crossings, of which 82 — or 65 per cent — required remediation⁵⁹. This, which is at tab 3, page 6, of the folder, is the chart produced by Dr. Mende, Costa Rica’s expert, which was adopted by Professor Thorne, Costa Rica’s other expert and included in his February 2015 report, which accompanied the Rejoinder⁶⁰. As you can see, of the 82 crossings requiring remediation, i.e., that are listed as mitigated, mitigation in progress or mitigation scheduled, only 28 — according to Dr. Mende — were “Mitigated”. Of the remaining 54 water crossings in need of remediation, 23 were described by Dr. Mende as “Mitigation in progress” and 31 were identified by him as “Mitigation scheduled”. This excludes the 21 water crossings that were described only as “Other”, about which Costa Rica says little more than that.

29. What does Costa Rica mean by “Mitigation in progress”? What kind of mitigation? How much progress has been made? When will the repair works be completed? What about “Mitigation scheduled”? Costa Rica says very little about what kind of mitigation is planned and nothing about when it will be performed. And zero is said about the 21 so-called “Other” sites. It would be troubling enough if this were simply a case of failing to provide necessary information. But it is not. It is a case of Costa Rica refusing to provide this information. On 24 February 2015, in correspondence on file with the Court, Nicaragua asked Costa Rica for its mitigation plans for

⁵⁸Weaver Summary Report, 15 Mar. 2015, para. 26.

⁵⁹2014 Mende Inventory, RCR, Vol. II, Ann. 3, p. 29, table 5; judges’ folder, tab 3, p. 6.

⁶⁰Thorne (2015), p. 138, table 7.5; judges’ folder, tab 6.

the 54 as-yet unmitigated water crossings, as well as its schedule for carrying out these works⁶¹. On 16 March, Costa Rica replied, giving Nicaragua a rather impolite brush-off; it wrote that the requested information “is either irrelevant to the present proceedings or otherwise a matter of exclusive concern for Costa Rica”⁶².

30. Perhaps this photo helps explain why Costa Rica has refused to provide the requested information. *This* photo, downstream of a failed water crossing, is at tab 3, page 7. Remarkably, this is one of the sites classified by Dr. Mende, and apparently accepted by Professor Thorne, as “Mitigation in progress”⁶³. As noted in the caption, the sediment retention dam has been undermined, and stored sediment has flushed into the San Juan River. Upon inspecting Costa Rica’s allegedly mitigated, or partially mitigated sites, Nicaragua’s experts observed at some of them that “minimal repairs . . . appear to have been implemented solely to provide a narrow and unsafe vehicle route across each failing stream crossing, not to reduce erosion, or stabilize the sites. The result was to condemn the sites to fail again . . .”⁶⁴

31. Mr. President, the second major problem regarding defects in the road, major problem 2, concerns its poor siting and construction along steep slopes. Dr. Weaver explains that,

“[o]n steep hillslopes, the typical construction method used by Costa Rica was ‘cut and fill,’ whereby heavy equipment was used to excavate the hillside on the upslope side of the Road, creating a flat road surface adjacent to a now-steeper slope (the ‘cut-slope’), [while the] material that [was] excavated was placed (bulldozed) onto the downslope side to form the outer part of the Road (the ‘fill prism’ or ‘fill slope’)”⁶⁵.

I know that for someone who is not a road engineer, that text may be difficult to follow and for that reason, both the proper and the wrong method of construction on slopes are illustrated in Dr. Weaver’s report and at tab 4, page 1 of your judges’ folder, which is on the screen now.

32. As Dr. Weaver further explains:

“The stability of the fill prism on the outer half of the road depends largely on how it is constructed. In the case of Route 1856, the construction techniques employed on steep slopes and slopes next to streams and the River were inappropriate

⁶¹Letter ref: HOL-EMB-024 from the Embassy of Nicaragua to the Registrar of the International Court of Justice, 23 Feb. 2015, Request Nos. 2-4.

⁶²Letter ref: ECRPB-036-2015 from the Embassy of Costa Rica to the Registrar of the International Court of Justice, 16 Mar. 2015, p. 4.

⁶³Weaver Summary Report, 15 Mar. 2015, p. 10, fig. 3; see also Mar. 2015 photo submission, p. 25.

⁶⁴Weaver Summary Report, 15 Mar. 2015, para. 19.

⁶⁵*Ibid.*, para. 27.

and have left many fill slopes composed of uncompacted, unstable soil materials that are prone to erosion and failure.”⁶⁶

33. During their site visit in 2012, Nicaragua’s experts observed that:

“Due to the Road’s proximity to the Río San Juan in many areas, failure of these slopes can entail the delivery of large volumes of sediment to the River. In 2012, it was apparent that many of the cut slopes and fill slopes were failing or showing signs of instability. We observed numerous overly-steep cut slopes that had failed . . .”⁶⁷

34. Costa Rica’s National Laboratory, LANAMME, agreed: “In cut areas no properly shaped embankments with slopes suitable to the existing soil type were observed. As a result, many of them look unstable and therefore susceptible to landslides, particularly in the rainy season.”⁶⁸ In addition, LANAMME, of the University of Costa Rica observed: “The fill material used to shape the road platform does not seem to have undergone any adequate compaction process. Said material appears loose in most sectors.”⁶⁹ Costa Rica’s National Laboratory and Dr. Weaver thus concur.

35. By the time of their site visit in 2014, Nicaragua’s experts found that

“the situation had visibly worsened in many locations. This was due in part to the fact that remedial works had largely been limited to 15 km of the Road, excluding some of the worst-eroding and most unstable slopes . . . Numerous overly-steep cut slopes and un-compacted fill slopes demonstrated high levels of erosion and failure . . .”⁷⁰

36. These findings are confirmed by Costa Rica’s own Dr. Mende. He reports that, as of December 2014, 190 of the 201 cut and fill slopes where construction had occurred required mitigation, four full years after construction had begun⁷¹. You can see this on the Dr. Mende’s chart, now projected on the screen, which is also at tab 4, page 2, of your judges’ folder. Of these 190 failed or failing sites, mitigation had been completed at only 25, as of December 2014. A site visit by Nicaragua’s experts earlier this year observed:

⁶⁶Weaver Summary Report, 15 Mar. 2015, para. 29.

⁶⁷*Ibid.*, para. 31.

⁶⁸2012 LANAMME Report, MN, Ann. 3, p. 29.

⁶⁹*Ibid.*

⁷⁰Weaver Summary Report, 15 Mar. 2015, paras. 33-35.

⁷¹2014 Mende Inventory, RCR, Vol. II, Ann. 3, p. 30, table 7; judges’ folder, tab 4, p. 2.

“The measures employed on the slopes were often insufficient and inappropriate for the type of erosion displayed at the sites. For example, the measures at some sites were limited to erosion control fabric or silt fencing that, even when properly applied, is inappropriate to address gullyng, landsliding, and slope instability.”⁷²

You can see what failing slopes look like in the photos at tab 4. This one, at page 3 of tab 4, was taken last month. The next pair of photos, at tab 4, page 4, show what Dr. Mende charitably called “mitigation in progress” at failing slopes: a few sheets of material covering only a small bit of a very large area of uncompacted raw earth bulldozed to form unstable and unprotected cut and fill slopes, in exactly the way Dr. Weaver said it should not be done.

37. Costa Rica provides minimal information on what works are being performed at the 107 slope sites where there is, allegedly, “mitigation in progress”, and Costa Rica conspicuously silent on when it is expected to be completed. They are equally close-mouthed about the 52 other sites where mitigation is merely “scheduled”. There is no indication of what is proposed to be done at those sites, or when. Nicaragua requested this information, too, in its correspondence of 24 February 2015⁷³. Costa Rica rejected the request⁷⁴.

38. This leads inevitably to the following conclusion, as expressed by Dr. Weaver: “On the basis of the information provided, the short, intermediate, and long-term effectiveness of CONAVI’s mitigation work is unknown, uncertain and cannot be predicted.”⁷⁵

39. Nicaragua acknowledges that CONAVI’s remediation of the road at some of the failing sites appears to have been acceptable. While Dr. Mende’s numbers may reflect a certain degree of generosity, we do not directly challenge his findings that 28 water crossings and 25 slopes have been mitigated. We have reviewed Costa Rica’s photos of some of these sites⁷⁶ and agree that good work appears to have been done at them. But these sites, as you have seen from Dr. Mende’s chart, are a drop in the bucket compared to the total number of water crossings and slopes that, according to Dr. Mende, still require remediation.

⁷²Weaver Summary Report, 15 Mar. 2015, para. 37.

⁷³Letter Ref: HOL-EMB-024 from the Embassy of Nicaragua to the Registrar of the International Court of Justice, 23 Feb. 2015, Request Nos. 3, 9-10.

⁷⁴Letter Ref: ECRPB-036-2015 from the Embassy of Costa Rica to the Registrar of the International Court of Justice, 16 Mar. 2015, p. 4.

⁷⁵Weaver Summary Report, 15 Mar. 2015, para. 24.

⁷⁶CONAVI, “Works on National Road 856: Before and After”, Dec. 2014; RCR, Vol. III, Ann. 11.

40. Nicaragua also recognizes that Costa Rica has provided evidence of some remediation work carried out by CODEFORSA, the forestry agency⁷⁷, as well as CONAVI. This includes the planting of trees and grass, and laying of mesh along or adjacent to certain exposed slopes. But, as Dr. Weaver observes — and you have already seen in several photos — CODEFORSA’s measures at hillslopes

“were often insufficient and inappropriate for the type of erosion displayed at the sites . . . Many of the slopes appeared to have been partially and inadequately treated several years ago and have not been touched since then. A number of slope and channel treatments were falling apart or failing, and had not been maintained.”⁷⁸

41. The third major design and construction flaw contributing to the failure of the road and the delivery of sediment to the San Juan River, major problem three, is the lack of proper drainage. As Dr. Weaver explains:

“Proper road design and construction should ensure that water draining from the road surface and ditches is dispersed and properly discharged, such that erosion is minimized and pollution to streams and wetlands is avoided or strictly minimized. Improper drainage can both damage the road and increase delivery of sediment to the surrounding environment.”⁷⁹

Unfortunately, due to improper drainage, that is precisely what has occurred here, and continues to occur all along the road.

42. According to Dr. Weaver, the type of drainage used by Costa Rica, the channelling of surface run-off into ditches that discharge into streams, “has been rejected under modern construction and design standards”⁸⁰. As a result: “Lack of proper surface drainage has caused gullyng of fill slopes and natural slopes at a number of locations along the Road. These were apparent in numerous locations in 2012.”⁸¹ The situation “had worsened by 2014”⁸², and had not improved by this year, when Dr. Weaver and his team observed:

“Our site visit in February-March 2015 confirmed that many slopes, including many of the worst-eroding sites, remain largely exposed . . . Erosion at these sites is

⁷⁷CODEFORSA Quarterly Report, Nov. 2014; RCR, Vol. III, Ann. 12; CODEFORSA, “Consulting Services for the Development and Implementation of an Environmental Plan for the Juan Mora Porras Border Road: Report of Contract SINAC-CDE-004-2012”, Nov. 2014; RCR, Vol. III, Ann. 13.

⁷⁸Weaver Summary Report, 15 Mar. 2015, para. 37.

⁷⁹*Ibid.*, para. 39.

⁸⁰*Ibid.*, para. 43.

⁸¹*Ibid.*, para. 41.

⁸²*Ibid.*, para. 41.

active and ongoing, and the connectivity of many of them to the Río San Juan continues to result in preventable, persistent sediment delivery to the River.”⁸³

43. Based on these observations, Dr. Weaver estimated that, because of improper drainage, fully “60% of the Road’s surface and ditch runoff is discharged directly to streams that drain into the Río San Juan”⁸⁴. At tab 5, page 1, and on the screen, you can see an example of Costa Rica’s use of improper drainage techniques implemented by CONAVI, Costa Rica’s national road agency. These photographs show how improperly designed drainage ditches transport sediment from the road surface to a stream, which then passes through a culvert and into the San Juan River. The next pair of photos, at tab 5, page 2, show how Costa Rica has deliberately constructed concrete drainage ditches that carry sediment from eroding slopes and road surfaces directly to the San Juan River. The vertical photo was taken in March of this year.

44. Costa Rica’s disregard for impacts on the river and Nicaragua is manifest, because it could have easily avoided the problem. According to Dr. Weaver:

“The form and magnitude of sediment pollution from Route 1856 to the Río San Juan due to improper drainage systems is almost completely preventable and can be almost completely eliminated by implementing road surface drainage systems designed to disperse surface runoff instead of collecting and discharging it to streams and to the Río San Juan. It is relatively simple and inexpensive to do so . . .”⁸⁵

45. What has Costa Rica done about all of these problems? According to Dr. Weaver:

“Four years after construction of the Road, widespread and effective mitigation is not apparent . . . The majority of watercourse crossings, cut slopes, and fill slopes remain unstable, exhibit significant visible erosion, and have not been treated or fully treated with appropriate stabilization and erosion control measures. The lack of progress is striking, as is the amount of work that remains to be done.”⁸⁶

Dr. Weaver observes that “[t]he inadequate planning and design, poor construction, and largely still absent remediation of the Road and its associated access roads has resulted in the delivery of 116,000-150,000 m³ of eroded sediment to the Río San Juan each year”⁸⁷. That is between 190,000 and 250,000 tons of sediment annually, quite a bit more than even the 75,000 tons per year that Costa Rica admits.

⁸³Weaver Summary Report, 15 Mar. 2015, para. 49.

⁸⁴*Ibid.*, para. 42.

⁸⁵*Ibid.*, para. 43.

⁸⁶*Ibid.*, para. 50.

⁸⁷*Ibid.*, para. 52.

46. In November 2013, Costa Rica told the Court it had already largely remediated the problems associated with the siting, design and construction of the road, and the resultant discharge of sediments into the Río San Juan. Their counsel told you then that additional remediation was required at seven specific points, which were displayed on a map, and that the works would be undertaken forthwith. That map, Costa Rica's map, is now on the screen. The Court appears to have taken Costa Rica's assurances into account in its Order of 13 December 2013, at paragraph 32:

“Costa Rica argues that it has itself already taken remediation measures in order to minimize the risks of any adverse environmental impact of the construction of the road. These works include the stabilization of cut and fill slopes, building ditches, installing permanent culverts and sediment traps, as well as planting vegetation. Costa Rica considers that these remediation measures suffice to render the provisional measures requested by Nicaragua superfluous.”

47. Mr. President, Costa Rica's actions in this regard appear to have fallen short of its representations to the Court. This is evidenced by its own expert reports: Dr. Mende's December 2014 study and the report of Professor Thorne accompanying the Rejoinder⁸⁸. Here, and at tab 6, are the charts from Professor Thorne's report, which are the same as Dr. Mende's. Even if we take it on faith, *quod non*, that 28 of the failed or failing water crossings, and 25 of the failed or failing slopes, were mitigated up to proper standards, what about the remaining 54 crossings and 165 slopes that Dr. Mende and Professor Thorne still considered to be in need of mitigation as recently as February of this year? The question takes on even greater significance when it is appreciated that Dr. Mende's and Professor Thorne's definition of a site requiring mitigation is one with “potential sediment input of any slope or watercourse crossing into the San Juan River”⁸⁹.

48. With this in mind, let us revisit the representations made by Costa Rica at the November 2013 hearings. Costa Rica pledged to complete remediation at seven points promptly⁹⁰.

⁸⁸See Thorne (2015), pp. 137-138, tables 7.4-7.5.

⁸⁹2014 Mende Inventory, RCR, Vol. II, Ann. 3, p. 5:

“For the reason that the principal question for the International Court of Justice is whether or not the border road is causing substantial harm to the San Juan River or any other Nicaraguan terrain, the evaluation of the mitigation status concentrates on the potential for sediment input of any slope or watercourse crossing into the San Juan River.”

⁹⁰CR 2013/29, 6 Nov. 2013, p. 20, para. 24 (Brenes).

The Rejoinder tells us that some of the promised remediation was carried out in these areas⁹¹. Let us assume that to be the case. How, then, is it possible that there were still, according to Dr. Mende and Professor Thorne, a total of 219 water crossings and slopes that required mitigation as recently as December 2014?⁹² Two explanations suggest themselves. One: in November 2013 Costa Rica dramatically underreported the number of locations requiring remediation. Two: the road was so badly constructed that, between November 2013 and December 2014, more than 200 water crossings and slopes collapsed or otherwise failed. Because we do not believe that our friends on the other side would deliberately mislead the Court, we can only conclude that many sections of this jerry-built road that had managed to survive until November 2013, or that had undergone some repair as of that date, caved in and failed sometime thereafter. That speaks volumes about the quality and condition of the road, the effectiveness of Costa Rica's remediation, the likelihood that failures at water crossings and slopes will continue to occur. What it tells us, Mr. President, is that, on Costa Rica's own evidence, the road is falling apart, and continues to fall apart, faster than Costa Rica can or is willing to repair it. And every failed water crossing and hillslope adds significantly to the sediment transported into the San Juan River.

Mr. President, we have committed to finish this presentation as close to 11.15 as possible, I have one page and a little bit more to go. I may still have 30 seconds left, but I would beg your indulgence to allow me to finish.

49. In regard even to the small proportion of sites that Costa Rica now claims to have remediated — only 35 per cent of the failing water crossings⁹³ and only 14 per cent of the failing slopes⁹⁴ — this is what Professor Thorne said in December 2013:

“[M]y experience suggests that with appropriate inspection and, where necessary, maintenance or repair, the mitigation works will significantly reduce local erosion rates for the next year or two, allowing time for the work necessary to design, contract and build permanent works to progress. However, [according to Dr. Thorne] *these are temporary works* [and I am quoting him directly] that mitigate but do not

⁹¹See CONAVI, 2014, p. 16; RCR, Vol. III, Ann. 11; CODEFORSA, 2014, pp. 18, 23, 37; RCR, Vol. III, Ann. 12.

⁹²2014 Mende Inventory, RCR, Vol. II, Ann. 3, pp. 29-30, tables 5 & 7; judges' folder, tab 3, p. 6 & tab 4, p. 2; Thorne, 2015, pp. 137-138, tables 7.4-7.5; judges' folder, tab 6.

⁹³2014 Mende Inventory, RCR, Vol. II, Ann. 3, p. 29, table 5; judges' folder, tab 3, p. 6.

⁹⁴2014 Mende Inventory, RCR, Vol. II, Ann. 3, pp. 29-30, tables 5 & 7; judges' folder, tab 3, p. 6 & tab 4, p. 2.

permanently solve erosion problems, and a permanent solution will not be achieved until design, planning and construction of the Road are completed.”⁹⁵

We believe that Professor Thorne, an eminently decent man — as you have seen — may have been a bit too trusting of Costa Rica’s assurances to him that their remediation efforts — many of which have now failed — would have had even the temporary effect, of a year or two before giving out. But, more importantly, we fully agree with Professor Thorne that there will be no permanent solution to the problem unless and until Costa Rica redesigns, replans and rebuilds the road — hopefully farther away from the river — to appropriate international, or even national, standards. There is no evidence — absolutely none — that this is what Costa Rica intends to do. Certainly, they have not done it yet. Professor Thorne does not say otherwise.

50. There is thus no relief, no “permanent solution”, to use Professor Thorne’s words, anywhere in sight. Except for that which the Court may provide in its final Judgment. Professor Pellet will discuss the specific remedies sought by Nicaragua in the final presentation tomorrow.

51. Mr. President, this completes Part One of my presentation on the evidence. Nicaragua will now tender its experts to the Court. The first expert is Dr. Weaver, whose qualifications I have already recounted. Dr. Weaver will be followed by Dr. Kondolf, with whom the Court is now familiar. In this afternoon’s session, Nicaragua will tender Dr. Edmund Andrews and Dr. William Sheate. In the case of each, his qualifications are set forth in the first paragraph of his summary report.

52. Mr. President, Members of the Court, I thank you for your kind courtesy and patient attention, and I await your instruction on whether to proceed immediately to the Court’s examination of Dr. Weaver, or to do so after a break.

Le PRESIDENT : Merci, Monsieur Reichler. La Cour entendra M. Weaver après une pause d’une durée de 15 minutes. L’audience est suspendue.

L’audience est suspendue de 11 h 20 à 11 h 35.

⁹⁵Thorne, “Assessment of the Impact of the Construction of the Border Road in Costa Rica on the San Juan River”, Nov. 2013; CMCR, Vol. I, App. A, p. 118, paras. 11.18-19.

Le PRESIDENT : Veuillez vous asseoir. La Cour entendra maintenant le premier des quatre experts cités par le Nicaragua ; commencera ensuite l'audition du deuxième expert, qui se poursuivra cet après-midi. Les deux derniers experts comparaitront cet après-midi. La procédure suivie pour l'audition des experts en l'espèce sera identique à celle suivie en l'affaire *Costa Rica c. Nicaragua*.

Le premier expert cité par le Nicaragua est M. William Weaver. Monsieur Weaver vous pouvez prendre place à la barre.

Bonjour, M. Weaver. Je vous invite à faire la déclaration solennelle prévue pour les experts, dont l'énoncé figure à l'alinéa *b*) de l'article 64 du Règlement de la Cour.

Mr. WEAVER:

"I solemnly declare upon my honour and conscience that I will speak the truth, the whole truth and nothing but the truth, and that my statement will be in accordance with my sincere belief."

Le PRESIDENT : Merci, Monsieur Weaver. Je me tourne maintenant vers M. Reichler, conseil du Nicaragua, qui va vous demander de confirmer l'exposé écrit qui se trouve devant vous. Monsieur Reichler.

Mr. REICHLER: Good morning, Dr. Weaver. May I ask you to confirm whether the three documents in front of you, that is, your summary prepared for the purposes of this hearing and your two reports prepared in the context of this case, reflect your honest, expert views?

Mr. WEAVER: They do.

Mr. REICHLER: Thank you.

Le PRESIDENT : Merci. Le Costa Rica n'ayant pas souhaité procéder à un contre-interrogatoire de M. Weaver, il n'y aura pas non plus d'interrogatoire complémentaire. Toutefois, un juge souhaite poser une question à M. Weaver. Je vais lui donner la parole et je vous demanderai de répondre à la question aussitôt après qu'elle vous aura été posée. Je donne la parole à Monsieur le juge Bhandari.

Judge BHANDARI: Thank you, Mr. President. Dr. Weaver, I have three questions for you. In paragraph 53, at page 19 of your Written Statement given to the Court on 15 March 2015, you have suggested some of the steps to be taken to minimize further impact to the Río San Juan. What is the scientific basis of these recommendations? For instance, what mathematical or scientific formulas have you relied upon on making these recommendations? This is one. If you would like to answer one by one I will do that or, if you want all the three questions to be put to you and then you would like to answer? The way you would like to answer.

Mr. WEAVER; One by one would be fine.

Judge BHANDARI: So, this is my first question.

Mr. WEAVER: They are not based on mathematical formulas, they are based on a process and experience developed over decades of looking at road systems and developing treatment plans for the restoration of those road systems and the reduction of sediment. I first got into this in 1976 and quickly learned that road systems were a major component of sediment delivery to rivers and streams and have focused my professional career on reducing those impacts. The five elements that I have listed here as first steps that need to be undertaken to treat the current road are based on that professional experience. And that is professional experience that has received widespread recognition and use, throughout North America anyway, for road systems on steep forest lands,

We provided those five recommendations and even expanded on them in earlier reports that you have before you from previous years. Do you want me to go over each one of those five, just very briefly describe what I am talking about with them?

Judge BHANDARI: No, I think that answers your question.

Mr. WEAVER: Yes.

Judge BHANDARI: There is another connected question. In your long experience as an expert, can you name any other border road in a tropical climate where these measures have been taken into consideration?

Mr. WEAVER: Not in a tropical climate. I have worked on and seen in a temperate rain forest climate these types of processes, undertaken to reduce sedimentation. And I think the key

component is not the nature of the climate as much as it is the geologic processes that operate. In other words, gravity works whether you are in the tropics or you are in a temperate rain forest environment and water flows downhill. *Sediment is eroded in* exactly the same *way* here as it would be in other parts of the world, so these are kind of fundamental and basic. They are developed fundamentally and basically on the physics of soil erosion and how to keep soil erosion to a minimum and to prevent sediment from being delivered to stream channels. So they are fairly fundamental processes, almost irrespective of the climate you are in, except for maybe where it would come to what revegetation tools and techniques you might use. Here you have rapid revegetation, like we do in the rain forests of the Pacific Northwest but, in terms of the structural measures you would use to control sediment coming off roads, they would be pretty much exactly the same.

Judge BHANDARI: Thank you. The last question for you. In paragraphs 3, 6 and 32 of your report, at pages 2 and 19, in your Written Statement, you have stated that construction of the road was carried out without sufficient or adequate planning or engineering design. Whereas in paragraphs 4 and 7 you have categorically mentioned failure to plan. Kindly clarify your stance as to Costa Rica's level of planning to constructing the road. In other words, kindly clarify or clearly indicate whether there was insufficient or inadequate planning or there was total failure of planning on the part of Costa Rica.

Mr. WEAVER: I have not seen any evidence either in written or oral statements to suggest there was any planning. There must have been some, at least by the equipment operators and contractors who were prescribed to build certain sections of the road and each of those contractors probably were left up to their own devices to construct sections in their areas that they were going to be doing construction work in. I have not seen any plans, nor does there show evidence on the ground of there having been uniform kind of planning for where you would locate the road, how you would design the road and how you would construct the road and accomplish mitigation measures as you were going along doing that construction work. Some sections of the road are constructed better than others. Some places where the hill slopes are very steep and the road was built right next to the river, show a complete lack of proper planning ahead of time that would have

prevented constructing the route in that location. They would have found an alternative route. Any kind of typical road design and planning process ends up, the first step of that is really designing and focusing on where the road is best located to minimize impacts and yet still accomplish your transportation needs. In many cases, in many locations, especially in the steeper portions of the road, that does not seem to have occurred. There are many places where the road could have been moved slightly inland and completely avoided some of the really worst erosion sites and slope stability problems that they have encountered.

Judge BHANDARI: Thank you very much, Dr. Weaver.

Le PRESIDENT: Merci, Monsieur Weaver. Ainsi s'achève votre déposition. Nous tenons à vous remercier d'avoir bien voulu comparaître devant la Cour. Vous pouvez à présent quitter la barre. Merci. Et j'invite maintenant M. Kondolf à prendre place. Bonjour, Monsieur le professeur.

Mr. KONDOLF: Good morning.

Le PRESIDENT : Je vous prie de bien vouloir faire la déclaration solennelle prévue pour les experts, telle qu'elle est énoncée à l'alinéa *b*) de l'article 64 du Règlement de la Cour.

Mr. KONDOLF: Excuse me, I am just trying to get one of these that works. Okay, I am on now.

“I solemnly declare upon my honour and conscience that I will speak the truth, the whole truth and nothing but the truth, and that my statement will be in accordance with my sincere belief.”

Le PRESIDENT : Merci, Monsieur Kondolf. Je me tourne maintenant vers le conseil du Nicaragua, qui va vous demander de confirmer l'exposé écrit qui se trouve devant vous. Monsieur Reichler.

Mr. REICHLER: Good morning, Professor Kondolf. May I ask you to confirm whether the three documents in front of you — that is, your summary prepared for the purposes of this hearing and your two reports prepared in the context of this case — reflect your honest, expert views?

Mr. KONDOLF: Yes, they do.

Mr. REICHLER: Thank you very much.

Le PRESIDENT : Merci, je donne maintenant la parole à Monsieur Wordsworth, conseil du Costa Rica, pour le contre-interrogatoire. Monsieur Wordsworth, vous avez la parole.

Mr. WORDSWORTH: Thank you, Mr. President. Dr. Kondolf, good morning.

Mr. KONDOLF: Good morning, Mr. Wordsworth.

Mr. WORDSWORTH: Can I ask you to go to paragraph 1 of your summary report?

Le PRESIDENT : Est-ce que je peux vous demander, Monsieur Wordsworth, de parler un peu plus près du micro pour les interprètes qui, semble-t-il, ont un peu de mal à vous entendre. Merci beaucoup.

Mr. WORDSWORTH: Thank you. So, paragraph 1 of your summary, and you say there, “Since October 2012, I have visited the Río San Juan six times, each time conducting observations of Route 1856 [that is the road, of course] via helicopter and boat”. That is correct?

Mr. KONDOLF: That is correct.

Mr. WORDSWORTH: As I understand it, you have also analysed satellite imagery of the road?

Mr. KONDOLF: That is correct.

Mr. WORDSWORTH: Just as a tiny point of detail, I understand that your overflights by helicopter were conducted at a height of approximately 300 m. Is that correct? That is what you say in your 2012 report.

Mr. KONDOLF: Well, certainly for the 2012 report; I think some of the others may have been different but I am not certain about that.

Mr. WORDSWORTH: You have not actually done a site visit along the course of the road on the land, is that correct?

Mr. KONDOLF: I have been on a riverboat, so I have been able to see sites from the river but, no, I have not been on the ground as that is Costa Rican territory.

Mr. WORDSWORTH: Did you ask to carry out a site visit along the course of the road, on Costa Rican territory?

Mr. KONDOLF: I did not personally, I think it may have been requested, but I am not sure.

Mr. WORDSWORTH: You carried out a limited sampling exercise, as I understand, of sediment *grains* from certain deltas on the banks of the river. Is that correct?

Mr. KONDOLF: That is correct.

Mr. WORDSWORTH: And you also took three suspended sediment samples from runoff from the road following a 15-minute downpour in May 2013, is that correct?

Mr. KONDOLF: Yes, I do not recall how long the downpour was but, yes . . .

Mr. WORDSWORTH: It is what it says in your third report.

Mr. KONDOLF: Okay, then that is fine.

Mr. WORDSWORTH: And you have identified, of course, a number of severely eroding sites and can I confirm that the bulk of these are in the 41-km stretch upstream of Boca San Carlos? I think that is just about to pop up on screen.

Mr. KONDOLF: That is correct, the bulk of them are upstream of the confluence of the Río San Carlos, yes.

Mr. WORDSWORTH: And you agree that if you were to carry out regular suspended sediment measurements upstream of the severely eroding sites and then to carry out such measurements downstream, before the confluence with the Boca San Carlos, then the Court would

have some hard data before it as to the impact of the sediment from the road, on the Río San Juan?
That is correct, is it not?

Mr. KONDOLF: Well, the Court already has hard data in front of it that sediment is entering the Río San Juan from the eroding sites on the road.

Mr. WORDSWORTH: Yes, that does not quite answer my question, my question was about hard data on impact. You will have heard Mr. Reichler this morning, he puts Nicaragua's case as one of "significant harm", and indeed characterizes the river as the "victim" of the road. So, my question is, if you had those suspended sediment measurements upstream of the severely eroding sites you have measured, and then downstream of those severely eroding sites, then we would be able to see evidence of actual impact, would we not?

Mr. KONDOLF: My answer to that is: first, if you are going to undertake a programme of suspended sediment sampling to try to detect the impact of an action such as constructing the road, which began I think in the fall of 2010, you would want to have suspended sediment samples beginning some years before, perhaps a decade before, so you establish an appropriate baseline. Even then you have to recognize that there is a lot of variability in suspended sediment data, variability in the flow, variability in the sediment data such that that would have to be taken into account in trying to interpret whether there is a change reflected. Now, it is very clear that sediment is getting into the river, that is agreed by experts for Costa Rica and Nicaragua, and there are different estimates for how much that is but it is very clear that sediment is entering the river and adding to the sediment load.

Mr. WORDSWORTH: Now, that is a very long answer. But the question is: if you measured upstream of the severely eroding sites in 2011, 2012, 2014, let us say on a monthly basis, and you measured downstream of the severely eroding sites on the same regular monthly basis across the three years, then you would have a series of relevant data, would you not? That is correct, is it not?

Mr. KONDOLF: Those data could be relevant, but again there is a lot of variability from year to year and from point to point that is just natural, so because of that variability the data could be helpful but you would not necessarily be able to detect at any significant level.

Mr. WORDSWORTH: So, let me *break* that down. You say “variability”, am I correct in thinking that there are no major tributaries coming in along the site of the severely eroding sites that you have identified upstream of Boca San Carlos, that is correct, is it not?

Mr. KONDOLF: Well, there are some, I would say medium-size, tributaries, but nothing as large as the Río San Carlos certainly.

Mr. WORDSWORTH: If you were expecting to see significant impacts, surely if you have a measurement regularly done upstream, measurement regularly done downstream, you would see some trend, some significant impact, would you not? If there were any?

Mr. KONDOLF: Again, there is a lot of variability. So, you might not be able to have a statistically significant difference, even though we know there is significant sediment going in the river — that is demonstrated both by the Costa Rican reports and the Nicaraguan reports — and it is important also not to confuse magnitude with significance. You can have a significant effect with a low magnitude event, or a high magnitude event with low significance.

Mr. WORDSWORTH: Correct.

Mr. KONDOLF: And here, the fact that the river is — as is pretty well agreed — overloaded with sediment, that implies that any further sediment would be a problem.

Mr. WORDSWORTH: Does it? Well, let us see, how would you analyse that? You say you could not analyse it by taking actual suspended sediment samples, so how else would you analyse it? Would you analyse it by reference to impacts on aquatic flora and fauna? Is that how you would analyse it?

Mr. KONDOLF: Well . . .

Mr. WORDSWORTH: Would that be the relevant data?

Mr. KONDOLF: Again, the fact that we know that the lower part of the river is overwhelmed with sediments — I forget the terms that have been used but there is agreement about that — that indicates that any further sediment would be a problem. Now, in terms of other impacts, you mentioned looking at the . . .

Mr. WORDSWORTH: You say it would be “a problem”. Just identify what you think the problem is, in terms of significant harm that this Court should be taking into account, in terms of significant harm to aquatic species, significant harm to, let us say, dredging downstream, what are the significant harms?

Mr. KONDOLF: So, let me start with the last thing you mentioned, dredging, since Nicaragua has a dredging programme which both Professors Thorne and van Rhee have indicated is barely keeping up with the excess sedimentation. So, any further sediment delivered to the river and deposited in the Lower Río San Juan adds to that dredging burden. In terms of the aquatic ecology impacts, we know that there are species within the families of fishes that occur in the Río San Juan that are sensitive to fine sediments. As Dr. Cowx said in his report, there is a lack of specific data for the Río San Juan. But certainly we know that some of these kinds of fish are sensitive to sediment. And then in terms of aquatic ecology, as you know, the CCT of Costa Rica conducted studies. They looked at ten tributaries along the south side, and sampled the macro-invertebrates upstream of the road and downstream of the road. And their results indicate an impact in terms of species abundance, I think, seven out of ten sites, they had higher abundance upstream than downstream, in terms of species richness, eight out of ten were higher upstream than downstream, indicating downstream was degraded and the water quality was better at nine of the ten sites, upstream versus downstream.

Dr. Ríos, in her report, describes her study in which she compared deltas that are on the Costa Rican side affected by the road sediment.

Mr. WORDSWORTH: I think we can take it that we have all read Dr. Ríos’s report. I understand that your answer is significant because increases to dredging levels; significant harm

because impacts to fish, although you cannot actually identify any fish that have been impacted. Is that correct?

Mr. KONDOLF: I cannot identify any species that have been impacted, but as Dr. Cowx pointed out, that there is a lack of site-specific data for the Río San Juan. So, as I said in my report, you do not want to confuse lack of data with lack of impact.

Mr. WORDSWORTH: Yes, but if you are making a case based *on* significant harm, you have to show data that shows impact. Do you have data that shows any impact to any fish at all?

Mr. KONDOLF: No, we certainly have information from literature that suggests it is possible. But there is a lack of data on fish impacts, I agree

Mr. WORDSWORTH: “That suggests it is possible”. That is as high as you can put that. OK, we will come back to Ríos in a moment. We will come back to dredging also in a moment. I just want to focus a little bit more on your answers on the use or otherwise of taking suspended sediment samples. Now, you are aware from the April 2011 Ramsar report, which we received a copy of last Thursday, *and* which I referred Professor van Rhee to on Friday, you are aware that that certainly suggests that a monthly sampling of suspended sediment is a useful exercise. That is correct, is it not?

Mr. KONDOLF: Yes, I did see the conclusions, and that was relating to the delta. Yes.

Mr. WORDSWORTH: Now, Nicaragua of course says this is a draft report, although Ramsar has not labelled it as a draft. And perhaps it will make submissions on that in due course, but we see this as an important document which, in due course, we will be asking the Court to read very carefully, so far as concerns its relevant sections. But the point for present purposes, that is saying with respect to a dredging exercise, it is useful to carry out a sampling exercise upstream and downstream, isn't it?

Mr. KONDOLF: Well, it is generally better to have more data. One thing to recognize, especially with the lower part of the river, those are alluvial channels, so if you are going to either

measure flow and/or sediment load, you have to take a lot of measurements, because the bed is potentially shifting all the time. So, what we call the “rating curve”, or the relationship between flow and the stage of the water, is likely to be changing frequently.

Mr. WORDSWORTH: Yes, but in terms of measuring the impact of an anthropogenic activity, Ramsar obviously thought it was useful to carry out monthly sampling of suspended sediment.

Mr. KONDOLF: Well, I do not disagree that that is what the report conclusion said, I will note that Professor Thorne was content with analysing the difference with the calculation, and I do not recall that he called for monthly sampling.

Mr. WORDSWORTH: That is very helpful, and I will come back to that in a second. Now, but you do accept, as a general proposition, Costa Rica is in a different situation to Nicaragua, it cannot go onto the Río San Juan and take measurements, you understand that?

Mr. KONDOLF: Yes.

Mr. WORDSWORTH: Now, with reference to what you have just said about Professor Thorne, are you aware that Costa Rica actually sought permission from Nicaragua in February 2013 to take sediment samples from the river, to test whether the road was causing any significant harm to the River San Juan, and that Nicaragua refused this? Are you aware of that?

Mr. KONDOLF: I recall seeing a request which seemed to me, very naïve. It said that they wanted take samples 100 m upstream of a tributary confluence and 100 m downstream, and the way it was written it indicated that there would just be one bottle of muddy water collected at each place, and a third bottle would be held by the Court. And that reflects a lack of understanding of what is required to measure suspended sediment loads.

Mr. WORDSWORTH: Well, in fact, Nicaragua responded, not by saying that it was a waste of time, but by saying — this is a letter of 5 March 2013, and we will obviously get copies in due course, but it is Annex 48 of the Counter-Memorial of Costa Rica — Nicaragua in fact, said, we are

not going to give you permission to do your own measurements, but we think a joint study would be beneficial. “Nicaragua considers that a study performed jointly in Nicaragua and Costa Rica, could be an effective mechanism, mutually beneficial, and that it would serve to implement the Order of the Court of 8 March 2011, provided that prior to the study, Costa Rica immediately cease the works, and present the corresponding technical information.”⁹⁶ So that is not entirely consistent with what you have just said. That seems to suggest that Nicaragua thought there was benefit to suspended sediment measurements.

Mr. KONDOLF: No, I think this is a different question. First, I was not aware of the details of this exchange. I am sorry, but when I was shown the request from Costa Rica, I was concerned about the way that it was being proposed to do the sediment sampling. That they would go out and take a grab sample somewhere in the river, and then analyse that. What you have to do instead — and this is very well spelled out in procedures developed by the United States Geological Survey and adopted, really, worldwide — you have to do what is called a depth integrated sample across the channel, so you measure at multiple verticals the entire water column, and you collect a sample from across the river, because there are huge differences in suspended sediment concentrations from the top of the water column to the bottom. And it can be across the river as well. And then, you take that sample, which could be — for a river like the Río San Juan — a dozen bottles or something, and then you analyse those to come up with your actual flow, your actual sediment flow.

Mr. WORDSWORTH: That is very helpful. So, you would have a way of getting reliable information in terms of impact on sediment load?

Mr. KONDOLF: Right, and from what I understand of your reading the Nicaraguan response, they did not specify exactly how it would be done but, presumably, if it were a joint study, that the experts on the two sides would design to do it correctly.

⁹⁶*CMCR, Annex 48, p. 264.*

Mr. WORDSWORTH: Yes. But the point I am interested in, you have just said that there is a sort of sediment sampling that can usefully be done, you have just referred to some United States reference. That is correct, is it not?

Mr. KONDOLF: That is right.

Mr. WORDSWORTH: Now, so far as you are aware, has Nicaragua done that?

Mr. KONDOLF: Nicaragua has taken some suspended sediment samples with their existing equipment, well, they have taken a few. And I think those were shared in an annex that was presented to the Court in the last case.

Mr. WORDSWORTH: That is correct. That is Annex 16, that is the INETER report, is it not?

Mr. KONDOLF: That sounds right.

Mr. WORDSWORTH: So, if you like, we can have a look at those. Do you think they might be significant? Professor van Rhee suggested that we could possibly draw significant conclusions from that. Would you agree with that?

Mr. KONDOLF: Again, you know we have spot measurements, but I would be happy to look at that with you.

Mr. WORDSWORTH: OK. So we have put those into the folder for you, tab 3. If you go to table 2, of tab 3, this may even pop up on the screen, let's see. You will see on page 304 — do you see table 2: 2012 measurement of liquid in suspended solids content.

Mr. KONDOLF: Yes, table 2. I see.

Mr. WORDSWORTH: I am only taking you to table 2 as it is the only relevant date. Do you remember: there are three individual samples taken — correct? — across a 6-year period. Do you recall that?

Mr. KONDOLF: I don't recall that, but I am looking at it now.

Mr. WORDSWORTH: OK. Look at 2012 if you will. Do you see that, five rows down, it says "5.1.2012" — which I think is 1 May 2012 — San Juan Castillo, and if you go along, I think the relevant column is the final column "Solid Q Daily" — I understand that shows the suspended sediment load, is that correct?

Mr. KONDOLF: I presume, yes, though the units are not given on this.

Mr. WORDSWORTH: I think for present purposes it probably doesn't matter what the units are, but I am sure my colleagues to the right are itching to tell me! Do you see, it says 1,052.37, you see?

Mr. KONDOLF: Yes.

Mr. WORDSWORTH: That's Castillo. And Castillo is a couple of miles above your seriously eroding sites, isn't it?

Mr. KONDOLF: Yes.

Mr. WORDSWORTH: Then, if you go down, the next column "San Juan mouth of the Lower San Carlos", that one assumes is the upstream mouth, so that is before the tributary comes in and you see 1,015.07; so, on this one element of data that we do have from Nicaragua, which actually shows no impact at all from the road, doesn't it?

Mr. KONDOLF: First, again I will remind you that there is a lot of variability in these samples and, if I can step back for a moment, just so that we have an appreciation — these numbers are not like when you get your bank statement and it says that you have 1,052.37 euros that that is exactly what you have — these are calculations based on these kinds of measurements that I talked about, going across the river to get the concentration of sediments and then those are multiplied by the flow. So the flow x the concentration gives you the total load. The flow measurements, if you are doing well, and a measurement that would be considered excellent is plus or minus 5 per cent, in a river like this probably plus or minus 10 per cent would be as good as you could hope for; so

there is a certain uncertainty just on the flow that you use and then on top of that there is some uncertainty with the suspended sediment concentration as well. So, most hydrologists/geologists would see that these were essentially the same.

Mr. WORDSWORTH: Yes, I think that that is very fair. The point I am trying to make to you is that if Nicaragua had made an extended sampling process, extended suspended measurement process, then we would have dozens and dozens of these figures to look at, not just the one, and you said Nicaragua has done some sampling, didn't you?

Mr. KONDOLF: Well, I think it is right here what you see.

Mr. WORDSWORTH: Yes, and this is the extent of it, isn't it? Am I correct in thinking that?

Mr. KONDOLF: Well, there may be other that has been done but this is what I am aware of. I guess another point to make though is how do we interpret these dates; is this the European format or the American format, are these May 2nd or . . . ?

Mr. WORDSWORTH: I think that unless there are 28 months in the year, that's probably quite easy!

Mr. KONDOLF: OK, so that's got to be May and April, which are the dry season. So we would not necessarily expect a lot of sediment coming in that as well.

Mr. WORDSWORTH: Dr. Kondolf, please don't think that Costa Rica is placing particular weight on these spot measurements. Costa Rica considers that Nicaragua had ready access to the river to carry out relevant suspended sediment data measurements and you have just suggested, by reference to the US model, that that would have been possible and useful. That is correct, isn't it?

Mr. KONDOLF: I think it would be helpful, yes, to have more data.

Mr. WORDSWORTH: And the point is that the only data that we do have shows no change. You can say it's not reliable data, and I am not going to disagree with you, but my point is you

have referred us to some data and I pointed you to the fact that the only data that you can point to shows no impact by virtue of the road. Is that correct?

Mr. KONDOLF: Looking at these data, you do not, given their limitations, you do not detect an increase in sediment load from El Castillo to above the mouth of the San Carlos. Again, that is during the dry season and I don't know that you would expect to see it during that time.

Mr. WORDSWORTH: OK. And as I recall, do you remember I mentioned you did these three samples in May 2013 following a 15-minute burst of rain; I think that is essentially the only other sort of sediment sampling that Nicaragua has put on to the record. And you don't suggest, do you, that those three samples show anything other than the fact that some sediment enters the river from the road. Is that correct?

Mr. KONDOLF: Yes, those were illustrative because we have images of plumes of sediment coming in to the river — and you have it on your screen there — immediately after rain on the road and this was simply a way of quantifying what were the concentrations within that muddy water coming off the road versus the relatively clear water of the river that was the receiving waters.

Mr. WORDSWORTH: Yes, but you're not saying it showed an exceptionally high concentration are you, even by reference to the suspended sediment usually in the river? That's not your evidence as I understand it.

Mr. KONDOLF: For that time of year that was exceptionally high; normally the river is relatively clear at that time of year — the dry season.

Mr. WORDSWORTH: As I recall it, Professor Thorne did a comparison of your three samples with a number of Costa Rican samples of suspended sediment, obviously taken from Costa Rican tributaries on the Costa Rican side of the river. Do you recall that?

Mr. KONDOLF: Yes, I do.

Mr. WORDSWORTH: Do you recall how many sediment samples Professor Thorne referred to?

Mr. KONDOLF: No, I don't.

Mr. WORDSWORTH: So, if I said 2,409 would that ring any bells?

Mr. KONDOLF: I would have to look at Professor Thorne's report.

Mr. WORDSWORTH: And do you recall your conclusion on that? I can actually read your conclusion in relation to that, just to check that you agree with it. This is your report of 6 November 2013:

“Professor Thorne notes that the suspended sediment concentrations in my samples of the muddy water plume flowing from the road (after a short downpour on 22 May) were not very high compared to concentrations measured in the river and its large tributaries during high flows. Granting his point, looking at Thorne's Figure 12 [and that's his data scan map: he puts a figure which shows where these 2,400 samples end up], we see that concentrations of about 400 grams per cubic metre are more typically associated with flows of exceeding 100 cubic metres per second, in contrast with the baseflow of the river at the time. While Professor Thorne emphasizes that the plume of sediment-laden water will eventually mix with the river water (true) [that's what you say, you say 'that's true'], I would emphasize that the plume flowing into the river from the eroding road, like the deltas that are composed of material recently eroded from the road, clearly demonstrate the essential fact that sediment from the road is entering the Río San Juan.”

So, your conclusion from those three samples simply seems to be that sediment from the road is entering the Río San Juan.

Mr. KONDOLF: That was the purpose and I should perhaps expand that the plot that Professor Thorne showed — we would call that a scatter plot: so he threw all the suspended sediment concentrations from all these different rivers of different sizes onto one plot — and the point is these are coming from various different streams, different conditions, wet season, dry season. It is really like apples and oranges: to say that this sediment concentration is exceeded, sometimes, in other rivers in Costa Rica, is not really a significant point.

Mr. WORDSWORTH: OK. That is not what you are saying there but let us move on. Can I ask you, do you still have the INETER report to hand, this was at tab 3, of the bundle before you. I

would ask you to just turn that open again. I suspect that this is something that is easily agreed to by all Parties. Do you see, I took you to the entries for San Juan Castillo and San Juan, mouth of the Upper San Carlos. Do you see the one below, the San Juan, mouth of the Lower San Carlos? If you go along to the final column, do you see that there is a dramatic increase, isn't there, in the sediment concentration in the river?

Mr. KONDOLF: Yes, I see that.

Mr. WORDSWORTH: It goes up from roughly 1,000 to 1,700; and that is typical, isn't it? That is what would expect to see because the San Carlos is a big tributary — high flows, high sediment.

Mr. KONDOLF: Yes, the Río San Carlos is a big tributary and it has been extensively deforested between 1950 and 1995. And as a result, its sediment yields are considerably augmented above the natural background.

Mr. WORDSWORTH: Yes. Now, just to understand from you: you are not saying that that impact of sediment, whatever the cause may be, you are not saying that that sediment coming into that river, into the Río San Juan at that point, leads to any impacts to fish — any fish mortality in the river, are you? So massive increase in sediment that comes in. . .

Mr. KONDOLF: I have no doubt that there probably — since the Río San Juan used to be of much lower sediment load, used to be a much clearer river — that when you get that kind of increase in sediment load, it has created conditions for fish that are unfriendly for the fish that are sensitive to sediment. So, either some of those fish have died or more likely they have just moved upstream.

Mr. WORDSWORTH: Do you actually even know what specific fish species inhabit the Río San Juan, at different points along the river?

Mr. KONDOLF: We have some data for the . . . most data were taken from the lower part of the river, down in the delta and down to the mouth.

Mr. WORDSWORTH: But what about this sector of the river that we are focusing on. Do you know?

Mr. KONDOLF: I do not know that there are any specific data; as Professor Cowx indicated there is a lack of data for the river.

Mr. WORDSWORTH: So you do not actually know what specific fish species inhabit this part of the river?

Mr. KONDOLF: That is correct. We know that there are fish families in the region and there would probably be some species of those families there.

Mr. WORDSWORTH: So on what basis are you suggesting that there might be adverse impacts to fish? You do not even know what the fish that are there are.

Mr. KONDOLF: Well, once again, lack of data does not mean lack of impact. The fact that we do not have data on this specific fish, or observations of negative impact from suspended sediment on the fish, does not mean that it has not occurred.

Mr. WORDSWORTH: I am sure not, but this is a court case, you understand, and Mr. Reichler has put his case as one of significant harm. That is why I am asking you these questions.

You do accept, don't you, that various species of fish in the catchment area positively flourish in environments with high levels of suspended sediment? That is correct, is it not?

Mr. KONDOLF: I think that there are a number of fish that are tolerant to high levels of suspended sediment and there are some fish that probably benefit from turbidity in terms of being less visible to predators or something like that.

Mr. WORDSWORTH: Now, you have referred to. . . So, on fish, with respect, it does not seem that you can point to any significant adverse impact, can you?

Mr. KONDOLF: We can certainly point to the probability of adverse impact on fish but no, we lack specific data for the Río San Juan.

Mr. WORDSWORTH: When you say probability, what would you mean is a percentage: 10 per cent probability? 60 per cent probability?

Mr. KONDOLF: I do not think I have enough to assign a percentage to that.

Mr. WORDSWORTH: Right.

Mr. KONDOLF: Unless there is some reason for me to do it, but I think that the fact is that certainly there is a potential.

Mr. WORDSWORTH: Do you think that the fact that you cannot even identify what specific fish species live in the Río San Juan impacts on your ability to give a specific probability?

Mr. KONDOLF: Yes, I suppose that if we knew more about the specific fish that were in the Río San Juan. We also have to take into account that the deforestation went on from 1950 to 1995. It was very controversial and so, if we are sampling the river now, we are seeing the river after it has already had those impacts. So that is another thing to keep in mind. But yes, if we had more information about the specific fish species that were in the river, and if there were some studies of their sensitivity to suspended sediment, then we could have a more informed assessment of the likely impact.

Mr. WORDSWORTH: I want you to just focus on the questions I am asking. You may think it is useful to say the word deforestation as often as you can, in every question, but we can leave that to Mr. Reichler to make the submissions he wants to on deforestation. I am not asking you questions that bring into play Nicaragua's case on that.

Now, you have also referred to a study by Dr. Blanca Ríos. And you say that this provides evidence of adverse impact on periphyton and macroinvertebrates, that is correct, is it not?

Mr. KONDOLF: That is correct.

Mr. WORDSWORTH: And do you know why she has not been called to give live evidence before the Court?

Mr. KONDOLF: No, I do not.

Mr. WORDSWORTH: And as you rely on her report, I am going to ask you some very limited questions on her study methods, just from the perspective of your expert perspective and if at any moment, you feel that this goes beyond your expertise, please just say so.

Mr. KONDOLF: OK.

Mr. WORDSWORTH: Now, Dr. Ríos sampled water from 17 deltas on the southern and northern banks of the San Juan River. That is correct, is it not?

Mr. KONDOLF: For the exact number, I would have to look at her report, but it is something like that.

Mr. WORDSWORTH: Now she did not take any samples from the river itself, correct?

Mr. KONDOLF: She took samples from the deltas which were on the edge of the river, the margin of the river.

Mr. WORDSWORTH: Yes, so she is basically standing on the river — sorry, standing on the delta and taking a sample from the water just above the delta. That is correct, is it not?

Mr. KONDOLF: She was sampling the shallow waters of the delta, in most cases the deltas were, most of the deposit was probably downstream of the tributary but I think that either *downstream* or upstream but she was basically wading in the shallow water of the deltas as it went into the river.

Mr. WORDSWORTH: So it follows that all her study can show *at* best is that there is a localized impact on the areas of those deltas. That is correct, is it not?

Mr. KONDOLF: So, yes, it shows an impact on the deltas, and remember that, for the macroinvertebrates, you need some kind of gravel substrate for them to be attached to and, you know, in most of the river, in this upstream part of the river, there is no gravel, that shallow gravel, out in the middle of the river so the only place that you have is on these deltas, on the margins.

Mr. WORDSWORTH: Well, is it not correct to say you would expect macroinvertebrates and periphytons along the banks of the river? Along the shallow water, along the banks of the river?

Mr. KONDOLF: Well, if you have gravel deposits, and we looked for gravel deposits but we did not really find much, so the best place that we would find macroinvertebrates was on these deltas.

Mr. WORDSWORTH: Yes, so you say you could not find, there would not be any macroinvertebrates on the bed, generally.

Mr. KONDOLF: Well, there would be some invertebrates out there. We were using, as Costa Rica did in its EDA, the study centre of the EDA, we used the methods which have become pretty standard now for environmental impact, and are in fact required by Costa Rican law, which is that you sample in riffles or gravelly substrates, because that is where you have the most bugs that are hanging on to the rocks and that has become the standard. So we were looking for those conditions where we could apply the method correctly.

Mr. WORDSWORTH: Right. I am just trying to focus on the use really of Dr. Ríos's report. I think we agree that she only sampled from the deltas and she does not herself extrapolate in any way, does she, those findings to any more general impacts in the river?

Mr. KONDOLF: I would have to go back and look at the report to see what her conclusions are, to remind myself of the specific things that she says. But certainly these are indicative of impacts that could be wider. These are the only places that we had to make any measurements.

Mr. WORDSWORTH: So if there were significant impacts, would you not also expect to see significant impacts, then, on the northern bank deltas, the deltas on Nicaragua's side of the river?

Mr. KONDOLF: No, because the Costa Rican deltas that were sampled that had impacts from the road, they were receiving high sediment yields directly from the road, and so that was impacting the conditions on those deltas.

Mr. WORDSWORTH: That is precisely my point. It is a very localized impact, isn't it?

Mr. KONDOLF: It is localized in the sense that this is one place we could measure, yes.

Mr. WORDSWORTH: There are many other places you could measure, but you haven't measured, have you?

Mr. KONDOLF: There aren't many other places that you could measure macroinvertebrates in the river because, as I say, there is, at least in the upper part of the river, you do not have big gravel bars or shallow gravel areas in the river *where you* would find macroinvertebrates like this.

Mr. WORDSWORTH: OK. And you have said that she is measuring input coming in from the road or the impacts of that coming in from the road. And I am right in thinking, am I not, that what is on the given delta is going to depend very much on the inputs? That is correct, is it not?

Mr. KONDOLF: When you say "what is on the delta" in terms of . . .?

Mr. WORDSWORTH: Macroinvertebrates and periphyton.

Mr. KONDOLF: Yes, it would be reflecting many things, but one of the main things is the input of sediment from the road.

Mr. WORDSWORTH: But it would obviously also be affected by the catchment area of the given stream, the sizes of the catchment area, what the nutrients are in the given stream, the quality of water that this arriving onto the delta. That is all going to affect what you have there, is it not?

Mr. KONDOLF: Yes, that is correct.

Mr. WORDSWORTH: And Dr. Ríos does not in any way cater for those impacts in her study, does she?

Mr. KONDOLF: She simply reports what was observed and those show that the deltas affected by the road sediment had impaired ecological status.

Mr. WORDSWORTH: Well, yes, but is that a reliable conclusion if she has not controlled for all the other differences in terms of what nutrient levels there may be coming in onto that particular delta coming in from Costa Rican territory?

Mr. KONDOLF: I do not see that that negates her study. You say control for it. I mean there are not that many deltas out there. You could not have all the drainage areas be exactly the same, or all the nutrient loads. For one thing, we do not have any data for what the nutrient loads are. What were the other things that you mentioned?

Mr. WORDSWORTH: The catchment area.

Mr. KONDOLF: The catchment area.

Mr. WORDSWORTH: It is going to impact markedly, is it not, on the level of nutrients and the quality of the water going into the delta?

Mr. KONDOLF: Well, remember, many of the catchment areas for the deltas that Blanca sampled on the Costa Rican side, many of those were very small catchment areas that were producing huge amounts of sediment because they were draining rapidly eroding parts of the road. So, you would not necessarily expect to have the same drainage areas for the different deltas.

Mr. WORDSWORTH: But the great majority of the drainage areas, the catchment areas, on the Costa Rican side were smaller than the catchment areas on the Nicaraguan side. That is correct?

Mr. KONDOLF: That is my recollection and that is because of this effect that the very rapid rates of erosion on the road are producing deltas from very small drainage areas compared to the natural deltas that are produced from a larger drainage area, lower sediment yields from a larger area.

Mr. WORDSWORTH: OK, well, let us have a look at those deltas now, seeing as you have been talking about them. Perhaps we could take you to your report, paragraph 48, sorry, your summary at paragraph 48. You see the bottom of page 16?

Mr. KONDOLF: Yes.

Mr. WORDSWORTH: “In addition to the accumulations of sediment in the Lower Río San Juan as, described by Dr. Andrews, at least eight huge deltas of road-derived sediment have accumulated at the mouths of tributaries along the southern bank of the River.” Yes?

Mr. KONDOLF: Yes, that is correct.

Mr. WORDSWORTH: If I could ask you then to turn forward to figure 11 in your report — this is towards the back, I think it is the penultimate page — just so we can get an impression of the scale of these huge deltas.

Mr. KONDOLF: That is the satellite image.

Mr. WORDSWORTH: Right. Well, *that gives you* a very good idea of their scale relative to the width of the river, does it not?

Mr. KONDOLF: Yes, for the amount of the delta that was exposed at that time. If I could interject very briefly, it is very important to keep the river level in mind when interpreting these aerial images because, with a higher river level, more of the delta will be under water and so the delta will appear smaller than at a lower water level.

Mr. WORDSWORTH: Fortunately, you have actually conducted measurements of the deltas, have you not? So, you know what their size is.

Mr. KONDOLF: Yes.

Mr. WORDSWORTH: And you conducted measurements, I believe, at a period where you thought it was higher flow in the river, that is correct, is it not? Or, sorry, lower flow in the river.

Mr. KONDOLF: We made some measurements during this last visit, so that was, I would say, a medium flow of the river.

Mr. WORDSWORTH: Right. So, that is, I presume you are putting those figures forward because they are representative? The measurements you have done, I presume you are putting them forward because you consider them to be representative?

Mr. KONDOLF: Which figures are you talking about now?

Mr. WORDSWORTH: Well, I will take you to them, I think in Appendix F to your 2014 report, you go through all the figures.

Mr. KONDOLF: OK, so the 2014 report.

Mr. WORDSWORTH: And Appendix F. Pages 122-129.

Mr. KONDOLF: So, May would be relatively low flow, so those would be relatively low flow.

Mr. WORDSWORTH: Right, so that would be low flow. So, that is the basic extent of them. Just so I understand further the scale, I suppose one could see further the scale of them on figure 12 of your summary, if you take a more close-up photo of them. Sorry, it is in fact the last page of your summary. You will see there are two photos there, and the one on the top you measured in the annex I have just taken you to and you say that was 15 m wide and as I understand it here, the river is about 130 m wide, just to give a scale. That is correct, is it not?

Mr. KONDOLF: I would have to check on the width of the river and I guess one other minor detail is that the measurements were made in May 2014 and the photo is from March or end of February of this year and it is very likely that this delta has increased in size since May 2014.

Mr. WORDSWORTH: Are you saying that is now more than 15 m wide?

Mr. KONDOLF: Well, first of all I have to say, "what do you say is the width?" Because the delta form continues going down underwater, so it depends on the river level what exactly you say the width is but I believe that it may have grown somewhat. Certainly, as you see on the last image, that is a view of one of those deltas and you see there is a culvert washed out and so pieces of that plastic culvert are incorporated in the delta and you can see that the delta has grown out quite a bit since incorporation of those pieces of plastic.

Mr. WORDSWORTH: I will take you to a photo of that delta just in a second but just to understand, and these are based on your measurements, so if you are asking me, "it depends how you measure", it does not depend on how I measure, it depends on how you measure. You said in your report that the second delta in this photo was about 10 m wide and in fact in your report you helpfully provided measurements of seven of what you call the "huge deltas" and in fact their areas are in the region of 100-200 sq m, and to give an element of comparison, the Great Hall here I am told is 425 sq m. Does that accord with your recollection?

Mr. KONDOLF: Yes, again I would need to check the figures but that seems about right and I do not have page numbers on this but I see that that delta is shown, if you go to Appendix F, it is the fourth page, there is an aerial view of that delta, delta 9.4.

Mr. WORDSWORTH: Then, if I can ask you, you refer to figure 13, I think this is a picture of figure 13 from your report, which I understand is the largest delta, I believe that is it. Yes, that is what, I understand from your report, you say is the largest delta. Do you recall that?

Mr. KONDOLF: I do not recall if the delta for 9.4 or 9.6 was the largest but they are both quite large, so it certainly could be the biggest one.

Mr. WORDSWORTH: Well, as we understand it, it is the biggest by a very considerable margin. It is 1,250 sq m, according to you. Do you recall what you said as the text to that particular photo?

Mr. KONDOLF: So this is from my summary report?

Mr. WORDSWORTH: No, this is from your actual report and you will see you put the photos in at the end of the judges' folder.

It looks to me that it has not come up sufficiently *clearly* so that you can read it. Let me read it for you. As to the top photo it says: "Photo date 2 May 2014", so I take it that would be a period of low flow, would it not?

Mr. KONDOLF: That is correct.

Mr. WORDSWORTH: Then the second photo is photo measurement date 30 March 2014 "Sediment deposit at mouth of *Caño Venado*, an example of a more natural deposit with a lower and wider profile indicating less rapid deposition."

Mr. KONDOLF: That is correct.

Mr. WORDSWORTH: So in fact the largest one by a considerable margin you have actually described as one as an example of a more natural deposit.

Mr. KONDOLF: Because that one has a fairly large drainage area draining to it. There is a pretty good sized stream that feeds that delta and I expect there was some delta there before the road was built, it was just augmented by sediment coming in from the road. And you can see that there is a lot of sort of orange coloured sediment in there which is very similar to the colour of sediment coming from the road, as you see in the top image, the oblique aerial image.

Mr. WORDSWORTH: Now you refer in your summary report to the CCT 2014 follow-up diagnostic assessment. You refer to that in paragraph 53, and if you look there, there is a reference to the CCT's . . . Sorry, I was just looking at the President there. Mr. President, how am I doing for time because I thought there might be a problem. Okay? Thank you?

You see at paragraph 53 then, you refer to the CCT environmental diagnostic assessment follow-up and you say this "strongly suggests sediment from the road is impacting the aquatic

community and contradicts the claim that aquatic life in the Río San Juan basin is fully adapted to high-sediment flows”. That is what you say there, correct?

Mr. KONDOLF: That is correct.

Mr. WORDSWORTH: Now, obviously it is a matter for submission what the CCT report does and does not say but can I ask you just to turn to tab 6 of this judges’ folder where we see what the CCT authors thought about the results of their sampling. If I can just clarify, this is entirely sampling on Costa Rican streams on the Costa Rican side of the river. That is correct is it not?

Mr. KONDOLF: That is correct, these are Costa Rican streams flowing into the Río San Juan on the Costa Rican side.

Mr. WORDSWORTH: That is right and, were there more time, I would like you to read paragraphs 7 through to 11 but, as there is very little time, can I just ask you to turn to their views on whether such impacts as they saw would have any impact on the Río San Juan? If I can just point to you at paragraph 8, they did not consider that the sediment from the road was having a significant impact on the bio-indicators studied at the sampling sites, specifically by reference to these Costa Rican tributaries. That is correct, is it not?

Mr. KONDOLF: Yes, they say that the impacts that they measured should not transfer to the Río San Juan and then they say that because the river is of a “superior order with a stream volume much larger than the water bodies in the study”. That is an assertion. If you actually look at their data, they do show impacts on these streams. Very significant impacts.

Mr. WORDSWORTH: I am talking about impacts on the Río San Juan. That is why I have taken you specifically to paragraph 11.

Mr. KONDOLF: Well, that is simply an assertion that they have in there. They presented some data which shows an impact and here they say, well, it should not affect the river because the river is bigger.

Mr. WORDSWORTH: Yes, well would you not agree with that as a general proposition?

Mr. KONDOLF: No. I think, well, two things. One is the streams like the deltas, these are some of the places where you can measure the effects of this very high sediment load from the road. So that is important, and it could have implications in other places where you can't measure it. And again, certainly the impacts would be more intense right there. But to say that there are no impacts on the river itself, that is not really supported.

Mr. WORDSWORTH: OK. And just to deal very quickly with those two responses: you say "you could be measuring" and of course, Costa Rica can't measure what happens in the Río San Juan. So far as you are aware, of course, Nicaragua has not carried out any measurements on the Río San Juan, except of course the Ríos delta measurements that we've looked at.

Mr. KONDOLF: Perhaps I misspoke, but I don't understand. You said that I said "you could be measuring": what was the context of that?

Mr. WORDSWORTH: As I understand it, you could be measuring, and I understood you were saying "you could be measuring on the Río San Juan what the impacts were on aquatic fauna in the Río San Juan".

Mr. KONDOLF: Perhaps I misspoke and if so I apologize. What I was trying to say is that there are only certain places that lend themselves to making these measurements. One of the places was the delta, because you have a collection of gravel that is this right kind of habitat for these kinds of macroinvertebrates. You have the tributaries coming in and affecting the aquatic communities there. And if you go upstream in those tributaries as the CCT did, they designed their study to measure upstream of the road and downstream of the road, assuming that the road sediment was impacting the downstream sites. And they found that for the abundance of macroinvertebrates, it was higher upstream at seven of their 10 sites; the richness was higher upstream at eight of the 10 sites and the water quality was higher at nine of the 10 sites. So they found a lot of evidence that the sediment was impacting the macroinvertebrates and the water *quality*.

Mr. WORDSWORTH: The point I am trying to make or the point I am trying to put to you is that Costa Rica has done sampling, it has shown according to the CCT certain changes at the “micro level” and as a “temporary response” to construction of the road, and what I am asking you is: has Nicaragua carried out any equivalent measurements so it can actually see what the impacts are on fauna in the river, once the stream comes into the river? And we have the Ríos study, besides the Ríos study, is there anything else?

Mr. KONDOLF: I think that is the Ríos study. And going back to the earlier part of your question, I think, if you read the CCT report, you do see something of a disconnect between their actual data that they present and the sort of conclusion that they present here.

Mr. WORDSWORTH: That of course is a question for submission, Dr. Kondolf. In the time that remains, I am just going to ask you a question about your figures on erosion, if there is any time that remains.

Le PRESIDENT : Je vous rappelle, Monsieur Wordsworth, que vous disposez au total de 100 minutes pour le contre-interrogatoire des experts cités par le Nicaragua. Vous pouvez poursuivre, si vous le souhaitez, quelques minutes de plus mais ce temps sera imputé sur celui qui vous restera pour procéder au contre-interrogatoire des autres experts.

Mr. WORDSWORTH: C'est absolument entendu. En fait, l'on m'avait dit que j'avais 62 minutes. I will keep it very short in that case.

So, on your measurements of the severely eroding sites, I just want to understand a little bit more about your methodology and as I understand it, you take the areas of severely eroding sites. If you don't mind just saying “correct”, for the transcript.

Mr. KONDOLF: Yes, that is correct. Well, I need to see where you are going next though.

Mr. WORDSWORTH: So you take the areas, you then take out the roadbed, and you apply a separate roadbed erosion rate to that?

Mr. KONDOLF: That is correct.

Mr. WORDSWORTH: And that leaves you with an area of around 612,000 sq m. Is that correct? You can take it from me, if your recollection is not up to that, that it is correct. And certainly counsel for Nicaragua will correct me if it is not.

Mr. KONDOLF: I believe that... I have a table of that somewhere, so maybe I can find that table and I can be more affirmative as you go along.

Mr. WORDSWORTH: I think the table you are referring to is on page 8.

Mr. KONDOLF: OK. So that does not give the areas. But OK.

Mr. WORDSWORTH: I know it is not very helpful in that respect. So, take it from me, 612,000 sq m, and you apply a slope erosion rate to that entire rate, through that entire area. Is that correct?

Mr. KONDOLF: For the entire area of the severely eroding sites which take up about 17.6 km of the river when you add them all together, for that entire area we applied a gully-and-landslide slope erosion rate to 40 per cent of that area. So assuming that 40 per cent of the severely eroding sites were actively eroding in this fashion.

Mr. WORDSWORTH: And what about the sheet rate? You applied a sheet erosion rate, is that right?

Mr. KONDOLF: Well so then for the remaining 60 per cent of those areas, we applied a sheet erosion rate, that is correct.

Mr. WORDSWORTH: And didn't you come to an average erosion rate that you applied across the board to that slope area of the severely eroding sites area of 612,000 sq m?

Mr. KONDOLF: Again, I don't remember how many square metres were involved and all those 17 severely eroding sites, but we distinguished 40 per cent that we attributed to having this very active kind of erosion that gullying landslide, and another 60 per cent to which we simply applied a sheet erosion rate.

Mr. WORDSWORTH: And so the question is: if you are right about the 612,000 sq m then if you have applied the right erosion rate to that, you come out with the correct figure. If you're wrong about the 612,000 sq m as being the relevant area, then of course, even if you've applied the correct erosion rate to that, then you will come out with the wrong figure. That's correct, isn't it?

Mr. KONDOLF: Yes, that would be a source of error.

Mr. WORDSWORTH: And, as I understand it from Costa Rica's experts, the area experiencing slope erosion is only 261,000 sq m, not 612,000 sq m. Is that your understanding?

Mr. KONDOLF: I would have to look at the Costa Rican report. I don't recall.

Mr. WORDSWORTH: That's fine. And do you accept just in terms of the way they have generated that figure, that Costa Rica's experts have now walked the length of the road identifying and measuring the relevant slopes, including as I understand it ~~would~~ with some sort of a hand-held electronic range finder. I mean you disagree with what they have done, I do understand that. But just to understand that they have carried a specific measurement exercise which you have not done.

Mr. KONDOLF: Yes. We were not on the ground there. And they were. I would be happy to critique some of the aspects of their new study if you would like.

Mr. WORDSWORTH: There is not time for that. Thank you very much, Dr. Kondolf. I should say that of course it will be open to Nicaragua to put questions in the cross-examination to Professor Thorne in relation to supposed flaws in that particular report. That would seem to be the appropriate area of cross-examination, or the proper focus for cross-examination.

Mr. KONDOLF: Indeed.

Le PRESIDENT : Merci. Vous avez utilisé une heure et sept minutes — 67 minutes — de votre temps ; il faudra donc en tenir compte en ce qui concerne la durée du contre-interrogatoire des experts suivants.

Merci, Monsieur Kondolf. Si le Nicaragua souhaite procéder à un interrogatoire complémentaire, il y sera procédé après la pause-déjeuner et, par conséquent, la Cour se réunira de

nouveau à 15 heures pour la fin de l'audition de M. Kondolf, s'il y a lieu. Et puis pour entendre les deux autres experts qui ont été cités par le Nicaragua.

Monsieur Kondolf, votre audition n'étant pas terminée, il vous est demandé de ne pas évoquer le contenu de votre déposition avec d'autres personnes pendant la pause-déjeuner.

Je vous remercie. L'audience est levée.

L'audience est levée à 12 h 55.
