Rechtsanwälte Günther

Partnerschaft

Rechtsanwälte Günther • Postfach 130473 • 20104 Hamburg

Oberlandesgericht Hamm
Heßlerstraße 53
59065 Hamm

Advance copy by fax: 02381/272-518

Michael Günther *
Hans-Gerd Heidel * 1
Dr Ulrich Wollenteit * 2
Martin Hack LL.M. (Stockholm) * 2
Clara Goldman LL.M. (Sydney) *
Dr Michéle John *
Dr Dirk Legler LL.M. (Cape Town) *
Dr Roda Verheyen LL.M. (London) *
Dr Davina Bruhn
Jenny Kortländer LL.M. (Brisbane)

1 Specialist lawyer for family law
2 Administrative law specialist
* Partner of the partnership
AG Hamburg PR 582

Mittelweg 150
20148 Hamburg
Tel.: 040-278494-0
Fax: 040-278494-99
www.rae-guenther.de

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Staff: Jule Drzewiecki
Extension: 040-278494-11
Email: drzewiecki@rae-guenther.de

In the case of

Lliuya	**./.**	**RWE AG**
/RAe Günther/		/RAe Freshfields pp./

the plaintiff responds to the defendant's statement of 10 July 2017 (received on 17 July 2017) as follows and supplements his grounds of appeal of 23 February 2017.

The following general remarks are submitted in advance of the plaintiff's detailed response to the defendant's argument:

The defendant (and the court of first instance) misconstrues the purpose of the lawsuit, which is not to establish the liability of a single issuer (RWE AG) for global climate change.

The sole objective of the claim is to obtain the defendant's participation in eliminating the acute disturbance to the plaintiff's property (i.e., the increased risk of flooding) in an amount proportional to its responsibility for the property disturbance, which is a consequence of the contribution of the defendant's power plants to climate change. The plaintiff now seeks to provide the

adjudicating court with evidence of the latter, specifically with the objective of establishing partial causation, for which the plaintiff bears the burden of proof.

It seems to the plaintiff, however, that his approach of holding the defendant accountable only for that which is under its control (the emissions from its own facilities) is now being used to argue that his claim is unjustified (or, with regard to the wording of the requests in his submission, 'lacking in specificity'): because the plaintiff is not demanding from everyone simultaneously everything that could protect him, the action should be declared inadmissible and unfounded ('alleged goal of legal protection' is unachievable, paragraphs 5 and 48 et seqq. of the defendant's submission). The defendant openly justifies its contribution by pointing to the 'millions and billions of people worldwide [that] release greenhouse gasses [GHGs]' (para. 5 of the response to the appeal). The defendant also argues that it should not be held liable because causes other than climate change are or may be jointly responsible for the recession of the glacier (para. 96 et seqq.) and because the defendant's contribution is so small that it cannot be considered a potentially verifiable cause (para. 129 et seqq.).

The defendant misconstrues the plaintiff's goal in seeking legal protection. The plaintiff aims to establish, on the basis of section 1004 of the German Civil Code [*Bürgerliches Gesetzbuch* (BGB)], that a causal contributor bears responsibility for costs associated with protective measures in an amount proportional to its causal contribution. The fact that he may also have further claims against other parties with a causal role cannot be interpreted to the detriment of the plaintiff, let alone preclude his claim by law.

In addition, much of the defendant’s response to the appeal is an attempt to portray the climatological and scientific interrelationships as generally too complex for a decision to be made in an individual case. In paragraph 134 et seqq., the defendant even fundamentally denies, for the first time, that there has been no demonstrable anthropogenic climate change as a result of GHG emissions; it alleges that, on this point, the uncertainty is too great.

However, it is not the case that the processes associated with climate change and its consequences preclude an argument for legal causality per se. No court has ever reached a decision to this effect in Germany (except for the decision of the court of first instance in the present case). No existing jurisprudence can be applied to this case.

It is true that it can be difficult to prove a causal chain between the emission of GHGs and a specific consequence of climate change, for example in the case of extreme weather events. However, this does <u>not</u> apply in the same way in the case of slow and steady changes in conditions (i.e., those of the 'slow onset' type), such as sea level rise or an increase in the water volume of a glacial lake as a result of accelerated glacier melt from a long-term temperature increase.

As the Intergovernmental Panel on Climate Change (IPCC) has expressly shown in its analysis, the correlation between cumulative GHG emissions and the rise in global temperatures is almost linear (see below). The IPCC recognises the causal relationships associated with glacier melt in the Andes as particularly clear; in fact, it identifies anthropogenic climate change as the greatest single cause contributing to glacier retreat.

Dr Christian Huggel again addresses this point in the context of the present proceedings in

Attachment BK1
(BK=Appellant)

Dr Huggel states in his expert opinion that local warming has led to considerable glacier shrinkage in the region, for which climate change is the 'most significant cause'. There is 'overwhelming evidence' to support this assertion. The enormous expansion of Lake Palcacocha is 'a direct consequence of the glacier retreat'.

Not even the defendant's submission of a large number of general scientific articles—unrelated to the individual case—on issues related to climate change can negate the fact that a lead author for the IPCC takes the above position, and that another prominent climate researcher (Prof Mojib Latif) confirms (in Appendix K 30) the partial causation of the GHG emissions from the defendant's power plants and thus their disruptive effect.

In the scheduled oral hearing, questions regarding 'methods of demonstrating' anthropogenic climate change can also be asked of

Prof Dr Mojib Latif, b.b.

whose credentials as an expert in climate science are indisputable. He will attend the oral hearing in person, even if not explicitly requested to do so.

The plaintiff notes that, in contrast to his own submissions, the defendant has not disclosed the names of scientists who apparently support its position. Before information is admitted into evidence—for example, through an order for evidence to be taken—the defendant must name the participating scientists to preclude the appointment of a biased expert witness.

The following is a summary of the position taken in this submission:

The causal chain presented by the plaintiff establishes that the GHG emissions from the defendant's power plants are a partial cause of the property disturbance. Because this causal chain is <u>not</u> beyond the possibilities of human comprehension,

a hearing of evidence cannot be prohibited for this reason alone. It is also not the case that, even without taking evidence, the assumption can be justified, merely on the basis of general life experience, that the power plant emissions cannot under any circumstances constitute one of the causes of the property disturbance and that there is therefore no need to take evidence. It is certainly not possible to assess, without further examination, whether the actual flood risk would be lower without the defendant's emissions.

The plaintiff is therefore of the opinion that—should the court consider the evidence presented to be insufficient—the German legal system requires the taking of evidence regarding the causal chain presented by the plaintiff and substantiated with evidence from expert opinions, because the defendant has denied practically all facts on which the claim is based.

In addition, the defendant, in addition to disputing all facts that justify the claim, frames its argument in terms of legal policy in much of its response to the appeal and refers to 'arbitrariness' (para. 48 et seqq.) and to the plaintiff's intention to reinterpret section 1004 of the BGB as a 'strict liability without fault' (para. 168) in the context of his claim. The plaintiff expressly contests this: he merely seeks to apply the law to the facts of a case not yet adjudicated by the courts.

Nothing in the provisions of section 1004 of the BGB or any other standard of German law indicates that the plaintiff's claim is problematic. All deliberations by the defendants and the court of first instance on principles that would exclude the claim are based on the (allegedly) limited function of German civil law (which is supposedly not intended for such cases) or on a restrictive interpretation of the legal requirements of actual causality by German courts under other circumstances.

However, the restrictive interpretation of section 1004 of the BGB, advocated by the defendant, clearly contradicts the legal justification in the commentary and notes [*Motiven*] on the BGB, a source to which the plaintiff again refers.

If the defendant is correct, there is no actual or legal causality. If, however, the plaintiff is correct, there is actual contributory causation, and the causal contribution is also adequately causal. A key problem in the judgment of the court of first instance, which is challenged in this appeal, lies in this insufficient clarification of the facts.

This document is structured as follows:

SECTIONS:

I. Questions of admissibility

1. Violation of the obligation to provide notice

The defendant believes that the district court has complied with its duty to provide notice, in particular because the plaintiff had received sufficient notice of the inadmissibility 'from the opposing party' (para. 10 et seqq.). This is incorrect—in fact, it is extremely odd to raise doubts about the existence of a 'joint municipality' (even if foreign) and to base the inadmissibility of an application on this, without giving the plaintiff the opportunity to provide concrete evidence on this issue. This could easily have been done at the hearing.

However, the court has neglected to provide a notice to this effect.

2. Specificity/Legitimate interest

In paragraph 17 et seqq. the defendant states that the main and alternative claims lack specificity [*Bestimmtheit*]. The plaintiff's position on this point does not deviate from that which he presented in his claim.

The case-law referred to by the defendant does not apply:

- In its decision in the case NZA 2017, 342, the Federal Labour Court [*Bundesarbeitsgericht* (BAG)] ruled that an application 'is not sufficiently specific in accordance with section 253(2)(2) of the ZPO if the claim refers only to statements that are neither defamatory nor otherwise relevant under criminal law. This does not necessarily mean that it is clear to the employer in every case whether it may issue a warning or termination on the basis of a statement.' The key issue is therefore whether what is required of the opposing side is clear without the need for legal interpretation. This is obviously not comparable to the present case. What the plaintiff wants to achieve is sufficiently clear to both the court and the defendant; in addition, the causal contribution is specified and can be identified, without any doubt, from the claim and the submissions of facts.

- The decision of the BGH in case NJW 2001, 445 concerns a contractual claim. The ruling contains, among other things, the statement that, in order to satisfy the specificity requirement in compliance with section 253(2)(2) of the ZPO, it is, in general, unnecessary to identify any plots of land concerned; even if such details are not apparent

  > from the wording of the claim, it is sufficient if they can be identified in connection with the plaintiff's submission of facts— which, according to the established case-law of the Federal Court of Justice, is to be used in the interpretation of the claim to determine the subject-matter of the dispute (cf. BGH, judgment of 24 June 1987 - I ZR 74/85, NJW 1987,3003 under I).

  This judgment supports the plaintiff's argument to a significant degree.

- With regard to the form of the claim, particularly with regard to section 1004 of the BGB, the plaintiff does not understand how the decision of the BGH in the case NJW 2004, 1035 is supposed to support the opinion of the defendant. The decision is consistent with the plaintiff's argument. The headnote to the decision states:

  > A party causing a disturbance may not only be sentenced to implement a specific measure if this measure alone would ensure that the imminent interference does not occur, but also if further measures are possible but cannot reasonably be considered serious options.
  > (BGH, judgment of 12 December 2003 - V ZR 98/03 -, juris)

  In any case, this ruling does not substantiate the existence of a legal principle that would require the plaintiff to state how a specific measure would eliminate the disturbance.

The plaintiff reiterates that no standing to bring suit is required to establish the entitlement to claim benefits payable to the Waraq association of municipalities (para. 28). He requests payment to a third party under whose jurisdiction preventative measures can be taken if the defendant cannot or is not allowed to do so itself. This request is presented as an alternative claim. Under the ZPO, it is only necessary for a claim to make clear that the defendant would be released from fulfilling the obligation to the extent specified in the claim. That is the case here.

3. Applicability of section 287 of the ZPO

In section 17 et seqq., the defendant defends the opinion of the Essen District Court [*Landesgericht*], which states that section 287 ZPO is not applicable to this case. This question is not only irrelevant to the main proposal, but it is also legally incorrect for the reasons already presented.

a)
For all facts establishing liability through causation, evidence was provided, and additional evidence was offered. The plaintiff rejects the defendant's suggestion in paragraph 30 that this is not the case.

Otherwise, in order to avoid repetition, the plaintiff primarily addresses the case law referred to by the defendant, while continuing to insist that section 287 of the ZPO applies here to causality that would determine the extent of liability (i.e., 'how much was contributed to the cause') [*Haftungsausfüllung*], not to causality that would establish liability (i.e., 'whether contributory causation occurred') [*Haftungsbegründung*].

In addition, there is no agreement regarding any limitations on the application of sections 286 and 287 of the ZPO in assessments of causation to establish or determine the extent of liability. Theoretically, a distinction can be drawn between liability law and compensation law. However, this distinction means that the causal connection between the action and the outcome 'are more or less arbitrarily ruptured into two parts that are difficult to differentiate from one another'.

> *Gottwald*, Schadenszurechnung und Schadensschätzung, 1979, p. 81

This was made clear in a 1972 decision of the BGH

> BGH, decision of 11 January 1972 - VI ZR 46/71 - juris BGHZ 58,48-56

regarding the causal relationship between an accident suffered by a pregnant mother and the child's congenital disease. The BGH does in fact conclude that

> the injured party [can] only rely on section 287 of the ZPO if the facts on which liability is based have been established. This ‘concrete reason for liability’, if contested, must first be proved by the plaintiff in accordance with section 286 of the ZPO.

The BGH then settles the question of causal grounds for liability by concluding that the foetus was 'also affected' by the accident:

> A child born with damage to his health fulfils his obligation under section 286 of the ZPO to prove, first, concrete grounds for liability (here the injury to his ‘health’), merely by proving that, as a foetus, he, too, was affected by the accident.

The principle established by the BGH would require full proof that the foetus had been injured as a result of the accident. The BGH based its action on equity concerns:

> Given the overall picture conveyed by the evidence, which has been confirmed by experts, no further evidence could be demanded of the child (i.e., the plaintiff).

The BGH referred to section 287 of the ZPO to determine the causal relationship between the child's being 'also affected' and his brain damage.

This case shows the difficulty in distinguishing between causality that establishes liability and causality that determines the scope of liability, on the one hand, and, on the other, the BGH's application of these concepts, which is by no means stringent.

If the taking of evidence reveals that it attribution of the causal contribution (0.47%) is impossible, it may be necessary to invoke these same equity considerations in connection with section 287.

b)

The decisions cited on p. 8 et seq. (para. 30) of the response to the appeal, which are intended to substantiate the applicability of section 286 of the ZPO to the present case, all address questions of causality establishing the grounds for liability. For the reasons outlined above, these decisions are not useful because there is no parallelism between them. The fact that this also corresponds to the established case-law is apparent from the case-law already cited by the plaintiff, as well as the decision to which the defendant refers in association with section 830 of the BGB.

> BGH NJW 1994,932
> Decision of 11 January 1994 - VI ZR 41/93 -, juris

The only passage cited repeatedly from this decision includes the statement asserting that, under the terms of section 830 I 2 of the BGB, no party can be excluded from the possibility that it was the sole cause of all damage.

In this decision, however, the BGH also emphasises the following:

> If the appropriate compensation cannot be ascertained for total damage, the defendant's liability for *damage can, at best, be set equal to the estimate reached under section 287* (emphasis of author) that was caused by the defendant alone (applicable partial causation).

Furthermore, the decisions cited by the defendant cannot be invoked for the following reasons:

In the first decision of the BGH cited by the defendant (NJW 2004, 777, 778), which concerns the significance of section 286 of the ZPO, the cause-effect relationship is rejected for <u>reasons of fact</u>:

> The revision does not preclude the BerGer. from concluding, based on the statements of the expert, that the significant impact that the plaintiff alleges to have felt when leaning on the dashboard, is not sufficient to trigger Sudeck's disease; this would require trauma, such as spraining or bruising, which the plaintiff would have noticed. However, from the plaintiff's submission alone, it is apparent that this was not the case. <u>These facts have led to the conclusion that the impact alleged by the plaintiff could not have caused the present clinical</u> presentation. (II. 1. a)

That is not the case here. According to the expert's statements, a cause-effect relationship in fact cannot be ruled out. In the present case, it appears, from the plaintiff's and expert's statements, that the causal link between the defendant's emissions and the increased risk of flooding is sufficiently certain. This was contested by the defendant and therefore must be assessed by the adjudicating court with regard to the facts of the case.

The next decision of the BGH cited by the defendant (NJW 1998, 3417, 3418) does not apply for the same reason, namely because the expert was sceptical that the primary injury had in fact occurred:

> Primary opposition to classifying the treatment error as ‘gross’ came from the expert report of Prof *S*, which was referred to in the grounds for the decision on the appeal. In the content of the

> report, which had been considered in the decision as part of the facts of the case, the expert expressed doubt that there had been an obstetric error on the part of the defendant at all.' (II. 2. a) aa))

The decision of the BGH cited next (NJW 1992, 2694, 2695) is only relevant to the present case insofar as it states with regard to section 287 of the ZPO that the plaintiff is not fully released from making statements due to the lower standard of evidence:

> Section 287 of the ZPO also eases the injured party's burden of presenting evidence. However, this is not sufficient if the plaintiff presents nothing to indicate what the situation would have been if he had made use of his right under the law to restrict inheritance liability by entering a plea on the basis of insufficient assets. That is the case here. (II. 3. c))

In the present case, this does not apply. The plaintiff stated that the contribution to total emissions was sufficient to establish the cause and offered proof substantiating this position.

The applicability of the decision of the OLG Düsseldorf (NJW-RR 2002, 26) was already addressed in the grounds of appeal (p. 26 of that document).

c)
Lastly, the decision referred to in paragraph 33

> BGH NJW RR 2014, 1118

does not lead to the conclusion that section 287 of the ZPO does not apply to the extent of liability in cases of partial causation.

In this decision, the BGH states:

> According to general compensation law, a contributory cause, even if only a catalyst acting in combination with other significant factors, is, under liability law, treated as the equivalent of the sole cause, with equal implications for full liability.

The decision also states that this 'full liability' does not apply in exceptional cases if it is established that the relevant misconduct 'has only led to a distinct portion of the damage, i.e., a definable partial causation exists' (marg. no. 35 of the reasons for the decision).

Of particular interest is the passage (not cited in the defendant's statements) of the text of the decision in which the BGH concludes:

> It is the opinion of the Court of Appeal that the defendants have produced the evidence to show that the greatest portion of the... damage did not occur in the period for which it... was liable to pay damages' (marg. no. 37 of the reasons for the decision).

The court therefore assumes that the defendant (not the injured plaintiff), as a party contributing to the cause, bears the burden of proof for the circumstances exonerating the defendant, i.e., for other partial causes that may have contributed to the damage or interference and may reduce the extent of its liability accordingly. This statement by the BGH, which was based on the rule of proof under section 286 of the ZPO, refers to the evidence to be provided by the defendant (not the plaintiff) to limit its liability in accordance with section 286 of the ZPO.

Therefore, the conclusion (i.e., that the burden of proof under section 286 of the ZPO also applies with regard to the extent to which the defendant has contributed to the cause) that the defendant derives from the decision of the BGH (NJW-RR 2014, 1118, 1121 marg. no. 26 (the intended reference is surely to marg. no. 36) turns the content of this decision entirely upside down.

In the context of the appeal brought here, this means: section 286 of the ZPO requires the plaintiff to furnish (solely) the evidence that the defendant's GHG emissions are responsible for the disturbance to his property (i.e., the threat to the plaintiff's property resulting from accelerated glacier melt above the lagoon).

The defendant has therefore thus far failed to provide evidence that, in accordance with section 286 of the ZPO, would prove that factors for which it is not responsible have contributed to the cause of the disturbance to a certain extent.

The decision of the BGH therefore fully supports the argument made by the plaintiff before the court of first instance and the Court of Appeal.

d)

Insofar as the defendant argues that the disturbance to the plaintiff's property is insignificant, the burden of proof for this allegation shall also be borne by the defendant:

Contrary to the provisions of section 906(1)(1) on legal relations between neighbours, the terms of section 1004(1) of the BGB indicate that significance is not a criterion for the circumstances of the legal offence that has given rise to the claim. Under section 1004 of the BGB, the plaintiff must therefore only demonstrate and prove that his property is indeed affected by an interference that was caused in part by

the defendant. It is the defendant's responsibility to argue and prove that the interference does not exceed the significance threshold.

cf. *Staudinger/*Roth, BGB (2009) section 905, marg. no. 3

The fact that the causal contribution is not insignificant was already explained in detail in the grounds of appeal and in the submission of 29 September 2016.

4. No amendment of claim

The supplementation of the main and alternative claims does not constitute an amendment of the claim. The supplemented content is obviously based on the same real-world context; it merely further specifies the claims presented in the first instance.

The defendant's references lead nowhere (paragraph 35 et seqq.).

II. Merits of the claim

1. Imminent disturbance

In paragraph 160 et seqq. and various other passages of the submission, in particular 111 et seqq., the defendant argues that there is no acute flood risk to the plaintiff.

In the statement of facts, however, the District Court summarised the circumstances as follows:

> In the event of a flood wave, the plaintiff's house would **most likely** be flooded (p. 2 of the court's judgment record).

This position should also be upheld in the appeal proceedings.

In accordance with section 529 of the ZPO, the Court of Appeal is bound by the substantive findings in the first instance, 'irrespective of whether these relate to the admissibility or merits or whether the circumstances are to be examined *ex officio* or are to be considered on the parties' own terms'.

Munich Commentary, ZPO, as of 15 June 2017
Rimmelspacher, section 529, marg. no.6

Thus, the disturbance has been established under section 1004, namely with regard to the existence of a 'seriously threatening impairment' (on this criterion, see also the defendant's own submission of 28 April 2016, p. 44).

Because the circumstances have been assessed as such under law, the defendant has also filed a motion to amend the facts of the case, which was rejected in the decision of 31 January 2017.

In addition, the defendant's submission on the Somos-Valenzuela study (Appendix K 38) is late. The argument is taken from the plaintiff's submission of 29 September 2016. On this point, the defendant would have had to refer, in the first instance, to section 530 of the ZPO in conjunction with section 296 of the ZPO.

As a precaution, in order to substantiate the assertion by the plaintiff that his property is facing a 'seriously threatening hazard', the plaintiff offers the following

Evidence (again): **Appendix K 37**
Expert witness Emmer
Expert opinion

The statement of the expert witness, Emmer (K 37), asserts that a flood event can occur at any time; the only question is when. (The defendant has not contested this specific statement.) This position is maintained in the present submission. The defendant's response refers solely to the Somos-Valenzuela study (Appendix K 38), within which a model was created; but this does not replace the corresponding expert statement.

The acute danger can also be confirmed through a presentation of the scientific basis for the study by Somos-Valenzuela (K 38), a co-author who wrote her PhD thesis on the consequences of climate change in the Cordillera Blanca [mountain range in Peru] (Rachel Chisolm, 2016, Climate Change Impacts and Water Security in the Cordillera Blanca, Peru, Civil Engineering, University of Texas at Austin).

Expert witness: Dr Rachel Chisolm,
invited through University of Texas at Austin, 301 E Dean Keeton St Stop C1700, Austin, Texas 78712-0273 | USA

The plaintiff contests the defendant's statement regarding the plaintiff's flood modelling (Appendix B 54), according to which the plaintiff's house is outside the flood zone. In the enlargement of the Somos-Valenzuela study, the representation is greatly simplified. In order to understand the accuracy of the ‘cross’ and the significance of the flood wave shown graphically, it is necessary to study the input data used in the model.

With regard to the facts of the case, the Peruvian authorities' hazard map, presented in Annex K 13, remains accurate. The plaintiff also contests the

allegation that the likelihood of a major flood catastrophe is low. The likelihood is not in fact minor; in the model, it is simply assumed to be lower than the other scenarios.

Evidence: As before.
Expert witness Dr Rachel Chisolm

The following points should be emphasised in detail:

In paragraphs 160–165, the defendant attempts to demonstrate that there is only a small probability that a large-scale flood scenario will occur. The defendant likely means that there is no 'seriously threatening hazard'. This is already legally incorrect for the reasons mentioned above.

However, the defendant also overlooks the fact that the legal relevance of a risk—when it refers to a property disturbance—is to be assessed according to two parameters: the probability that damage will occur and the scope of the possible damage. Even if the probability of a large flood were assumed to be low (an assumption that is contested here), any potential flood wave would be so destructive to the plaintiff's property that the threat to the property does indeed constitute an interference under the terms of section 1004 of the BGB.

The property disturbance required for the application of section 1004 of the BGB continues to exist.

2. Attributability to individuals

In paragraph 40 et seqq., the defendant defends the opinion of the court of first instance, according to which a 'linear chain of causation' is a prerequisite for any liability for a disturbance under the terms of section 1004 of the BGB (and under liability law in general).

The grounds of appeal evaluated multiple decisions (especially those based in medical law), including the court decision on vaccine injury, the circumstances of which are no less linear than the climate system as a result of the complex processes that take place in the human body. There is no legal provision in German law that requires the 'linearity' of a causal chain as a prerequisite for the existence of a causal connection between cause and effect. The IPCC, in contrast to the defendant, describes the relationship between anthropogenic emissions and rising temperatures as 'largely linear'.

The decisions cited by the BGH and the Federal Constitutional Court [*Bundesverfassungsgericht* (BVerfG)] are not transferable to climate damage caused by GHG emissions, as already explained in detail.

In the forest damage decision [*Waldschadensurteil*], an 'individualisable causal chain' was required, according to the BVerfG, because, without it, contributory causation could not be proved at all. It was conceivable, and could not be ruled out, that the specific emissions had not contributed to the result in dispute. However, if, in a theoretical scenario, the defendant's emissions were eliminated, the global temperature increase would be lower by a corresponding amount; the glacier above Palcacocha Lake would melt less quickly; the water volume of Palcacocha Lake would be lower; and the acute danger of glacial lake outburst flooding would pose a less severe threat to the plaintiff's property.

See *Frank*, NVwZ 2017, 664, 666 et seq.

This substantiates the causal relationship.

Evidence (as before): **Appendix K 30**
Appendix K 31
Appendix BK 1
Expert witness: Christian Huggel b. b.
Expert opinion

The references cited by the defendant and attached as appendices refer to the issue of causality in the 'forest damage case' and simply do not apply to the present case. The same is true of the excerpt from the explanatory memorandum to the Environmental Liability Act [*Umwelthaftungsgesetz* (UmweltHG)].

The legal argument presented—i.e., that the UmweltHG prevails as *lex specialis* in cases of environmental damage arising in connection with 1004 of the BGB—is incorrect. Section 18(1) of the UmweltHG explicitly states: *'Any liability on the basis of other provisions shall remain unaffected.'* Section 1004 of the BGB is one such provision.

In sum, there is no legal reason to allow the liability of large issuers to be subsumed under the 'collective irresponsibility' of the countless small emitters whose contributions to climate change do not qualify as relevant impacts.

With regard to the burden of proof, the plaintiff again submits the following comment:

Cumulative damage, as it relates to climate change (climate change and its consequences are caused by various emitters), can be classified, on a conceptual level, as 'multiple perpetrators acting independently but in parallel' [*Nebentäterschaft*]. See, for example,

Palandt/Sprau, BGB, 2017, section 830 marg. no. 1, with reference to BGH NJW 2001, 2538, 2539:

> Multiple perpetrators act independently but in parallel if several offenders have caused damage by independent individual actions without deliberate interaction. Although the perpetrators are jointly and severally liable to the injured party as joint and several debtors, each perpetrator is liable only for the distinct portion of damage that it has caused.

It is obvious that, in such a case, the plaintiff is responsible for proving only joint causality, i.e., partial causation.

3. Legal consequences of a decision/unconstitutionality

On the defendant's considerations regarding legal policy and moral concerns (para. 48 et seqq.)—which, in the plaintiff's opinion, are legally irrelevant to these proceedings—the plaintiff submits the following statements:

It is clear that reducing the water volume of Lake Palcacocha by approximately 81,780m^3 cannot *fully* eliminate the present flood risk. However, the acute danger to the plaintiff's property would be *reduced* by decreasing the water volume by this amount.

Evidence: Expert opinion
Expert testimony of Adam Emmer, b. b.

Regarding paragraph 50, the following should once again be made clear: in the *Kivalina* case, the liability of the utility companies (here the defendants) was denied under general US federal law (federal common law) due to certain features of the US Environmental Protection Act, not due to a lack of legal causality as the defendant is attempting to suggest.

Contrary to the considerations outlined in paragraph 52 et seqq., liability for climate damage comports with the legal concept of an equitable reconciliation of interests between the owners of different plots of land with regard to their use and cross-boundary disturbances. This concept was even expressed in the commentary [*Motiven*] to the BGB. The grounds of appeal addresses this point (p. 21 et seqq.).

Understandably, the defendant does not specify the constitutional grounds that would justify the release of plant operators from liability for the consequences of emissions emanating from their property. The existing case-law of the BVerfG on the 'nuclear phase-out' provides no general protection for plant operators to rely on existing laws or to operate in non-compliance with current law under a continuation permit.

BVerfG, decision of 6 December 2016 - 1 BvR 2821/11 - juris

The disturbance of uninvolved landowners by emissions emanating from other plots of land, without compensatory claims for protection, is precisely what is meant by unlawful and disproportionate interference with the property of landowners.

4. On equivalent causation/Criteria for a 'disturber'

In paragraph 57 et seqq. (pp. 15–31), the defendant contests all statements by the plaintiff on the causal link between the conduct of the defendants (i.e., emissions from the power companies) and the disturbance to the plaintiff's property. A specific response is provided for individual paragraphs, but the response does not restate the basic legal context already outlined in the notice of appeal or the detailed presentation of the actual context that was included, with evidence and offers of evidence, in the written statement of 29 September 2016. These passages are referred to below, along with specific page numbers.

Paragraph 57:

The plaintiff does not allege that there would be no climate change without the defendant's emissions. The claim relates solely to the defendant's contribution to the cause of climate change and to the disruption to the plaintiff's property that has occurred as a consequence of climate change.

Paragraph 58:

It is true that foreign judgments do not set a precedent for German lawsuits. It is noteworthy, however, that foreign courts are increasingly affirming the legal viability of climate change issues and the legal responsibility of actors with regard to climate change. In these rulings, the courts have affirmed the justiciability of climate change issues, as well as the responsibility to prevent climate damage. This is also the case in a lawsuit—currently before a US federal court—that was filed by children and adolescents against the US government.

> Kelsey Cascade Rose Juliana , et al.,/United States of America, et al. US District Court for the District of Oregon, 6:15 cv-01517-TC,
> all documents available at: www.ourchildrenstrust.org

In this case, the court has already accepted the principle that there is a basic legal causality between the US government's failure to reduce emissions and the concrete consequences of the damage to the

plaintiffs. The scientific interrelationships are comparable to those in question here.

Since July 2017, new cases have also been pending in the United States, including for injunctive relief and damages for the consequences of sea level rise on the California coast. The plaintiffs are Marin County and San Mateo County (i.e., administrative districts) and the city of Imperial Beach, California. The defendants are 37 companies representing the oil and gas sector.

> *The County of San Mateo* v *Chevron Corp. et al*., case number 17cv03222, *The County of Marin* v *Chevron* Corp. et al., case number 17cv02586, and *The City of Imperial Beach* v *Chevron Corp. et al*., case number 17cv01227; Superior Court of California
> **Appendix BK 2 (English language only; provided for information purposes)**

These lawsuits are based, among other things, on the fact that the US Supreme Court, in its decision in the 2006 case US Supreme Court of *Massachusetts* v *EPA*,

> https://www.supremecourt.gov/opinions/06pdf/05-1120.pdf

expressly assumed that CO2 emissions from vehicles operating in the USA were partially responsible for causing sea level rise and coastal erosion in Massachusetts and, on this basis, affirmed that the US Environmental Protection Agency had an obligation to review stricter exhaust emission regulations and, if necessary, to introduce new emission standards (as then occurred).

> See also *Frank*, Staatliche Klimaschutzpflichten, NVwZ 2016, 1599 et seq.

Paragraphs 59–68:

It is **not** true that, according to the plaintiff, the basis of the legal suit (the disturbance to the plaintiff's property from the acute flood risk) would cease to apply if all potential causes were eliminated. First, the plaintiff is of the general opinion that mere contributory causation must be sufficient and that there is no need for a limitation on the basis of the legal provisions of section 1004 of the BGB.

However, the plaintiff also argues, in accordance with the case-law of the highest courts, that the flood risk would be lower if the defendant's emissions to climate change and its consequences were eliminated. The plaintiff thus applies the principles of partial causality to the specific interference; the defendant has misinterpreted this.

Paragraphs 60 and 67:

There, the undersigned reproduces the prevailing view in the literature on the general issue. As stated explicitly in the article and elsewhere, however, the literature does not address the specific facts of global climate change or its concrete, local consequences. At no point does the cited article preclude the possibility that there might be evidence of partial causality on the part of individual issuers. The court's decision will be based on this concrete case and its factual context, with regard to which the plaintiff, in his view, has proved actual partial causality.

Paragraph 61:

The citation from *Kohler* refers explicitly to *minimal* immissions, such as those from individual drivers. The quantity of the emissions from the defendant's power plants is not minimal; these emissions constitute approximately 0.5% of the total global CO2 emissions and have a noticeable influence on global temperature changes (see submission of 29 September 2016, p. 17 et seqq. including an offer of evidence, which is expressly referred to here).

Paragraph 65:

The plaintiff has not changed his interpretation of the law. In the submission made when filing the complaint, the plaintiff argued that there is sufficient proof of the causal chain because the IPCC has concluded, with the highest degree of confidence, that there is a clear and dominant anthropogenic influence on the (observed and undisputed) melting of the Andean glaciers, and the defendant has contributed to this phenomenon.

The subsequent submissions merely substantiate the argument regarding this causal chain because the defendant does not believe that this fact applies to the specific lagoon, Lake Palcacocha. This is expressly confirmed by Huggel, the expert witness, in Appendix K 30 and Appendix BK1, among others.

In addition, the plaintiff offered to provide expert opinions from the outset if the court considered an expert opinion necessary with regard to the specific glacier/lake and the defendant's contribution to the cause. The plaintiff cannot understand where the defendant sees a contradiction here. The plaintiff continues to refer to statements by the world's most distinguished committee of scientists, whose credibility has been confirmed by German courts and the German legislature on several occasions, as well as to the fact that the defendant contributes to global climate change (a fact not disputed by the defendant) and thus to its local consequences.

Paragraph 70 et seqq.:

The legal prerequisite for legally relevant causality is not the 'linearity' of the causal chain, but equivalence in the sense of the *condicio sine qua non* formula and adequacy. It is not apparent to the plaintiff why the

use of climate models (which ultimately represent the technical augmentation of expert knowledge) should be excluded from civil proceedings (para. 73). In addition, the facts underlying the complaint are not a future prognosis, but rather an assessment of past events and their current consequences.

The uncertainties that generally must be taken into account for forecasts do not exist in the same way here. Proof of these connections has already been offered; this offer is reiterated here.

Evidence: Expert witness Prof Dr. Mojib Latif
Dr Christian Huggel
Expert opinion

In the vaccine injury case brought before the BGH,

BGH NJW 1955, 1876

it was (medically) 'established', based on an expert statement, that the vaccination was the cause of death. Ultimately, this was nothing more than a conclusion that the vaccine can explain the death scientifically and, according to the expert, does explain it.

In the present case, the plaintiff has submitted expert testimony from which it is clear that, without climate change and the defendant's contribution, the flood risk would not be the same and might not have developed as a result of anthropogenic climate change in the first place. This would be confirmed by a concrete, unbiased report.

Expert opinion

It is not clear to the plaintiff what the 'fundamental' legal difference is supposed to be. Reference to the quantified statement of probability, which the defendant missed, is taken from Palandt, 2017, Vorbemerkung, section 249, marg. no. 27.

Paragraph 74:

The plaintiff has argued that the emissions from the defendant's power plants, which account for 0.47% of total CO2 emissions, have contributed to the increased concentration of GHGs in the atmosphere and, accordingly, the increase in global temperatures. The global temperature rise has also led to correspondingly higher temperatures in the region of the Palcacocha glacier. This rise is a cause of accelerated glacier melt, which has led, in turn, to an increase in the water volume of Lake Palcacocha and

the danger to the plaintiff's property, which is located below the glacier lake.

Statement of Christian Huggel Appendix BK 1
Appendix K 30
Appendix K 37

The increased threat to the plaintiff's property would therefore be correspondingly lower without the defendant's contribution to climate change, and the specific threat would not be the same. This decision is ultimately based on physical assessments.

Evidence Expert witness Prof Dr Mojib Latif

This does not contradict the fact that, at present, the volume in Lake Palcacocha may be slightly lower than it was a few months ago, as the defendant asserts; this would indicate a slight seasonal fluctuation. A new measurement is not available. In addition, it should be pointed out once again that the decision of the court of first instance established in February 2016, with binding effect, that the volume was 17.4m^3 and that the flood risk did in fact exist. The request to correct these facts was rejected.

The actual flood risk to the plaintiff's house continues to exist, even if the volume of the lagoon varies slightly each year (as the plaintiff himself has pointed out). The defendant cannot now justify the allegation by claiming that El Niño has reduced the volume in the short term.

For all questions on the influence of local temperature changes, glacier retreat, the considerable change in volume over the last 30 years, and the current flood risk, evidence has already been offered, and this offer is repeated here. The

Expert witness Adam Emmer (b.b.)

was at the site in July 2017 and can provide detailed information on these questions.

Paragraph 76 et seqq.:
In addition to natural GHG emissions, anthropogenic emissions lead to a correspondingly higher concentration of GHGs in the atmosphere. The density of the GHG molecules accumulating in the atmosphere would be lower without the anthropogenic emissions, and therefore (*condicio sine qua non*) the global temperature rise would be lower as well. These interrelationships are summarised in Appendix K 18.

It is true that GHG molecules in the atmosphere are partially degraded. However, this does not alter the existence of a causal chain between the emission of GHGs and rising temperatures. Each emission is a partial cause of the observed concentration in the atmosphere and thus of the warming, even if a certain percentage of the molecules may be absorbed in sinks, because this also means that a corresponding percentage of the GHG molecules emitted from a specific source are released into the atmosphere.

Evidence: Appendix K 31
Expert testimony of Prof Mojib Latif
Expert opinion

The degradation of the GHG molecules over time refers to all molecules that rise into the atmosphere. It changes nothing regarding the contribution of the emitted molecules to the concentration of GHG molecules in the atmosphere—a concentration that would be correspondingly lower without the release of these molecules into the atmosphere.

The defendant tries to explain here that the causation of a behaviour can only be proven by the presence of the individual CO2 molecule in the atmosphere. This is not scientifically explicable, as already stated. In contrast to the case on forest damage, here the defendant cannot assert that its behaviour (possibly) did not contribute to the present situation.

Evidence: As before.

Paragraph 78 et seqq.:

The statement in paragraph 78 is blatantly wrong and, in the plaintiff's view, serves as a 'smokescreen'. The defendant conflates CO2 concentrations with CO2 growth rates in the atmosphere. The figure included there (Figure 6.12) shows the rates of CO2 increase, not CO2 concentrations. With regard to the question of CO2 concentrations that is relevant to this case, the appropriate reference from the IPCC report is the following figure (from: Appendix K 18, p. 10)

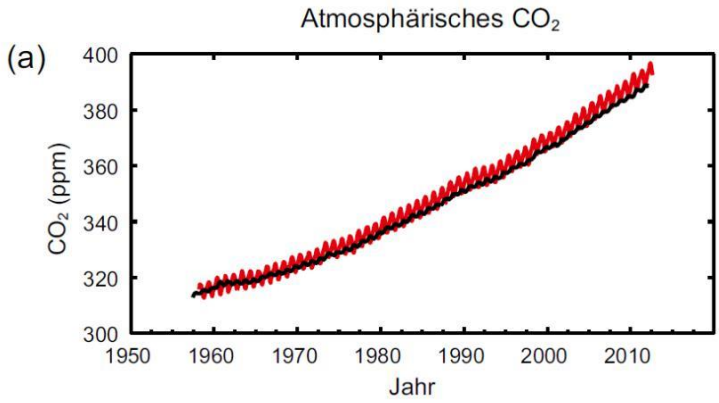


Abbildung SPM.4 | Mehrfache beobachtete Indikatoren eines sich verändernden globalen Kohlenstoff-Kreislaufs: (a) Atmosphärische Kohlendioxid (CO_2)-Konzentrationen vom Mauna Loa (19°32'N, 155°34'W – rot) und vom Südpol (89°59'S, 24°48'W – schwarz) seit 1958. (b) Teildruck von gelöstem

There are no relevant fluctuations; instead, there is a steady trend that is present on a global scale.

In the present case, it is relevant, in evidentiary terms, whether anthropogenic climate change has contributed to the situation in the tropical Andes and the retreat of the local glaciers, as well as the subsequent melting of Lake Palcacocha. The answer is supplied by the current IPCC Progress Report (see submission of 23 November 2015, pp. 14 et seqq.), which the defendant ultimately claims to doubt. Evidence was also provided in concrete terms (see Appendix K 30 and **Appendix BK 1)** and additional evidence was offered. This offer is repeated here.

Paragraph 85 et seqq.

First, the defendant's statements confirm that the global rise in temperature is scientifically undisputed. The deviations between the various studies in the determination of the average global temperature rise (para. 86) are minor, as the defendant states correctly.

What is certain is that—regardless of the study on which a conclusion is based—the overall global temperature rise would be significantly lower had there been no increase in anthropogenic GHG emissions.

Evidence: As before.

If the defendant is attempting to suggest here that, based on one of these studies, the specific situation in the Peruvian Andes shows **no** clear indication of anthropogenic impacts, this allegation is contested. The cited studies are all based on the statement by the IPCC that it is 'extremely likely', with a probability of 99%, that anthropogenic climate change is

the dominant cause of the extensive melting of tropical glaciers. Please also refer to the submission of 29 September 2016, p. 4 et seqq.

Paragraph 88:

The question of what role the 'uncertainty interval' plays must be classified correctly. According to the defendant, the 'uncertainty' of the expert statements with regard to average temperatures also prevents an allocation to individual issuers' emissions of responsibility for the temperature increase. This is not the case. The uncertainty interval is deduced from the different models on which the IPCC's future projections are based. In the IPCC report, various expert assessments are synthesised to develop the 'best assessment', which the plaintiff cannot and does not intend to question.

In Appendix K 31, Prof Mojib Latif states unambiguously that emissions from individual large-scale emitters also produce a *temperature response*, i.e., a warming reaction. There is a separate calculation methodology and research field to examine this subject, the basics of which were described in the submission of 29 September 2016. Evidence was offered at that time, and that offer is repeated here.

At this point, the defendant also conflates the question of causality that justifies liability (i.e., has the defendant contributed to the increase in temperature?) [*haftungsbegründende Kausalität*] with the extent of the causation [*haftungserfüllende Kausalität*]—which, from the plaintiff's perspective, can be proved on the basis of emissions contributions documented in expert reports (see below).

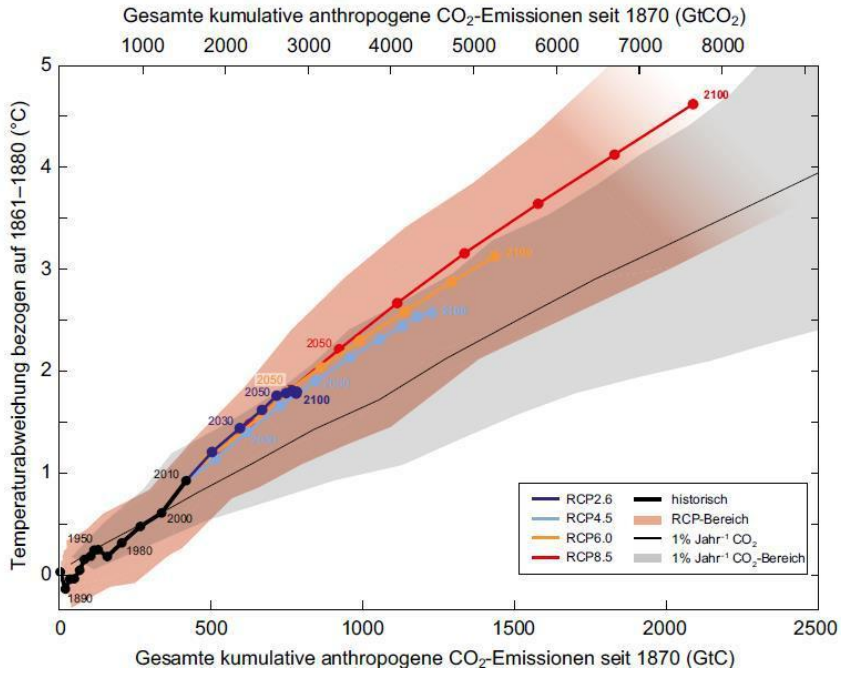
Paragraph 89:

There is a largely linear correlation between anthropogenic emissions and the temperature increase (see also Appendix K 18, p. 26), as has been mentioned above, included in Appendix K 18 as a citation, and corroborated and explained by the expert, Huggel, in Appendix K 30.

The IPCC report 'Summary for Policymakers' (Annex K 18) expressly states the following:

> Cumulative CO2 emissions and the reaction of the average global surface temperature of the Earth exist in a roughly linear relationship.

(See Figure SPM.10.)



It is evident from the graph that, regardless of the specific climate model, the correlation between rising emissions and rising temperatures is clear, even independent of annual fluctuations (which, of course, are present). The defendant's assertion that this is not the case, and that the plaintiff did not provide a source, is false and questions the results of the IPCC.

Paragraph 90 et seqq.:

The defendant states here that it became colder, not warmer, from 2002 to 2012 in the Cordillera Blanca. There was a so-called hiatus, the defendant claims, in which there was a 'decrease in the average temperatures' (para. 91, 95). These statements are false.

From the results of the established international research on temperature change in the region, it is apparent that the warming continued. The authors of the studies

> Schauwecker et al. 2014 (Global and Planetary Change) (Appendix of the defendant - B 9)
> Vuille et al. 2015 (Journal of Geophysical Research), **Appendix BK 3**

show, substantiated by careful research, that warming was continuous through 2010 and 2012. No cooling is apparent in the Andean areas of

the region of Huaraz. Even if fluctuations were noted in individual years, the warming trend remains.

See the testimony of Christian Huggel, Appendix BK 1

Please refer to Appendix K 30; to the statement of the expert witness, Huggel; as well as to the submission of 29 September 2016, p. 6 et seqq. The plaintiff has provided evidence that anthropogenic climate change also has a local impact. The parties dispute all details, but interestingly, the defendant does not respond to the specific statements of the experts.

Specifically, there the plaintiff substantiated his opposition to the defendant's assertion, in paragraphs 92 and 93, that there had been no local warming. In Appendix K 30, clause 4, the scientist, Huggel, explicitly takes a position on the study of Schauwecker et al.—to which the defendant has once again referred—regarding the significance of the temperature data since the 1980s. He emphasises that:

> It is true that the temperature rise in the Cordillera Blanca has also contributed to the recession of the glacier.

It is incomprehensible to the plaintiff why the defendant refers to these studies again if the co-author has expressly rejected the conclusions drawn from them in the court proceedings. Obviously, the defendant cannot provide any evidence to substantiate its scepticism of the expert statements.

The studies in Appendices B 44 and B45 (para. 90) do not show a general reversal in the local warming trend attributable to climate change; they only address the consequences of the El Niño events and the hiatus in a comparative way and state that this is 'statistically relevant'. The plaintiff contests the argument that these studies prove anthropogenic climate change has had no influence on the local situation. These papers do not contain any such statement, nor do they address the reason for the recession of the specific glacier or the increased volume of Lake Palcacocha.

The elements of the defendant's argument on the so-called hiatus in general—and their unambiguous invalidation—can also be found in

Medhaug et al. Appendix BK 4

This new analysis shows that there is no such thing as the 'hiatus' as referred to by the defendant; it is merely a proposition that many climate change deniers use for support. However, the authors of the Medhaug et al. study explicitly state the following:

> Combined with stronger recent warming trends in newer datasets, we are now more confident than ever that human influence is dominant in long-term warming.[1]

Paragraph 94:

The Berkeley database, the extract from which has been included in paragraph 94, is a global dataset that is not suitable for local assessments and cannot be used to weaken the location-specific assessments in the Schwauwecker (Appendix B9) and Vuille (BK3) studies. Lower relative warming does not demonstrate a 'cooling trend'.

Evidence: Expert testimony of Dr Christian Huggel
Expert opinion

The plaintiff never claimed that the local temperatures were constant. In the context of a retreating glacier, this is not important. The question at hand is whether anthropogenic climate change has played a role—perhaps even a dominant one—in the dangerous expansion of Lake Palcacocha. Based on the synthesised data of the IPCC (Appendix K 30, Appendix BK 1) this is in fact the case. Supplementary information was offered in the

Expert opinion

Paragraph 96 et seqq.:

The defendant reiterates further (possible) causes of glacier melt in the Andes, based on the premise that a 'linear correlation' is necessary for legal causality. Reference is made to the submission of 29 September 2016, p. 6 et seqq.

The defendant would like to overlook the fact that there are multiple causes for all life circumstances, for every consequence. This does not exclude disturbance liability. On the contrary, in **Appendix BK 1**, evidence is again submitted substantiating the fact that anthropogenic climate change is also the dominant cause of melting in the Peruvian Andes. The offer to provide

Evidence: **Dr Christian Huggel b. b.**
Expert opinion

is renewed here.

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[1] German*: Zusammen mit stärkeren Erwärmungstrends in neueren Datensätzen sind wir sicherer als je zuvor, dass der menschliche Einfluss dominant ist für die langfristige Erwärmung.*

Evidence has been offered to establish the links between climate change, temperature rise, loss of glacier mass, and the expansion of Lake Palcacocha, including an explicit offer of an

Expert opinion

in the form of a concrete *attribution* study. It would be expedient for the court to initiate this during the taking of evidence, because a study of this kind, if submitted by the plaintiff, would be rejected by the defendant as a biased report.

Based on the IPCC report presented and the statements of the experts interviewed, the plaintiff believes there is no evidence to substantiate the assumption that glacier retreat is not significantly influenced by climate change. The natural causes of changes are not legally relevant on their own; therefore, it is necessary to provide evidence of the defendant's contribution to the greenhouse effect rather than evidence of such changes per se.

The anthropogenic contribution to the melting of tropical glaciers (most of which are located in the Cordillera Blanca) through climate change has been proven. See also Fig. 2 of the attached article by a team of authors led by Prof Marzeion, the expert cited above.

Appendix BK 5

This article, which appeared in *Science* magazine, evaluates a model that, unlike the work presented by the defendant, uses aggregate data to attribute glacier recession to specific causes, including anthropogenic climate change as a causal factor. From the result, it is apparent that anthropogenic climate change bears a clear responsibility for this retreat in the specific location studied, which included the Cordillera Blanca. The assessment is identical to that of the IPCC, which the plaintiff presented in the initial claim.

Paragraph 98:

The defendant's citation of Dr Huggel's explanation is incomplete and misleading. In the *Spiegel* interview cited by the defendant, Dr Huggel does not say that it is impossible, but that it is 'somewhat difficult' to establish a connection between the GHG emissions and the flood risk, ***'even though the harmful influence of greenhouse gasses on glaciers around the world has been proved beyond doubt'***. In Appendix BK1, Dr Huggel confirms once again that it is possible (if necessary) to determine the attribution of causes and reasons in concrete terms:

> If a concrete attribution/breakdown of the reasons for the specific situation at Lake Palcacocha is necessary because causal contribution to climate change is not legally sufficient, this information can be acquired through a suitable 'attribution' study.

Paragraph 99:

The defendant alleges that the glaciers retreated less in the second half of the twentieth century than in the first half, which it claims provides evidence against the dominant influence of climate change.

This statement is false.

The article by *Leclerq* (B 48), to which paragraph 99 refers, provides no assessment of the 'low-latitude' area in question that would imply that the glacier retreat was more substantial in the first half of the twentieth century than in the second half. In fact, the scientific analysis of Rabatel 2013 (Appendix of the defendant(!), B 1) shows that glacier shrinkage in the tropical Andes during the second half of the twentieth century was considerably greater than in the first half. The defendant's assessment is diametrically opposed to the assessments contained in Appendix **B 1** (Rabatel et al. 2013), graphs 3 and 4.

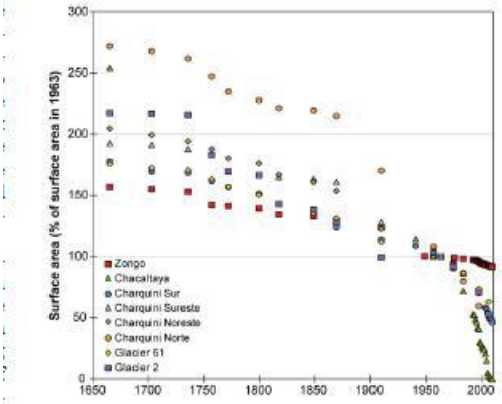


Fig. 3. Changes in the surface area of eight glaciers in the Cordillera Real, Bolivia, since the LIA maximum, reconstructed from moraine stages (LIA maximum and before 1940) and aerial photographs (1940 and after). 1963 was chosen as the common reference. Data are from Rabatel et al. (2006, 2008a) and Soruco et al. (2009a).

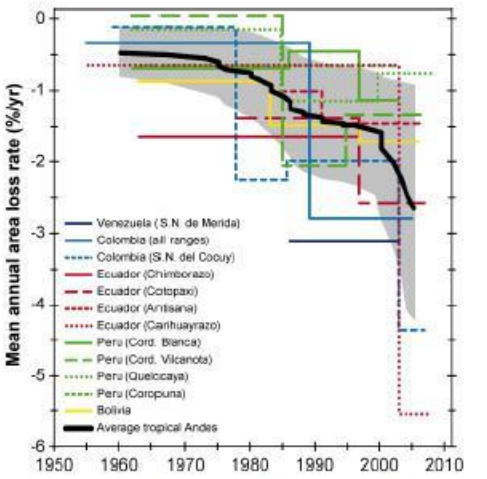


Fig. 4. Compilation of mean annual area loss rates for different time periods for glaciated areas between Venezuela and Bolivia. Surface areas have been computed from maps, aerial photographs, satellite images and direct topographical measurements. Sources are given in the text. Note that the average (smoothed using a 5-yr running mean) is computed from a varying number of values depending on the period concerned because fewer data were available for the first decades of the study period. The grey box around the average represents the uncertainty corresponding to ±1 standard deviation.

This graph shows the actual mean annual area loss in the Peruvian Andes (green lines); this loss is obviously greatest after 1970.

Paragraph 100:

The passage in the plaintiff's submission to which the defendant refers concerns the global contribution to causation, based on the corresponding data in the IPCC Report of 2014 and beyond. It is taken from the specific presentation to which reference is made, and can be proved and explained by

Expert witness Ben Marzeion, b. b.

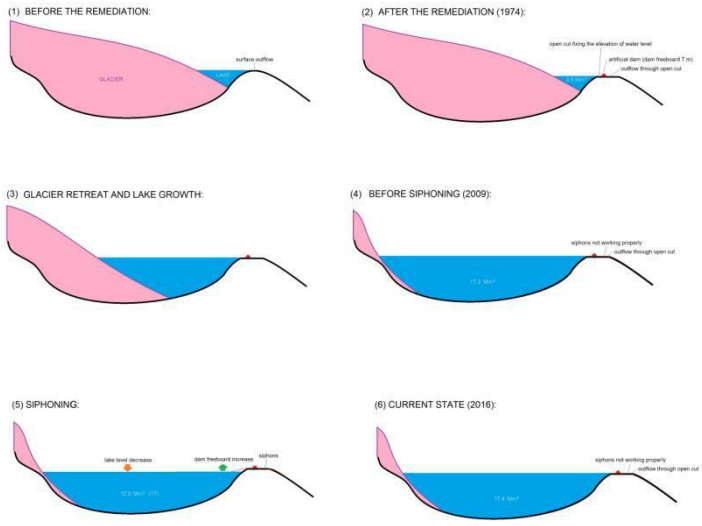
Paragraph 101 et seqq.:

The volume and surface area of the Palacaraju and Pucaranra glaciers have decreased significantly in the twentieth century. As a result, the surface area of Lake Palcacocha has grown considerably.

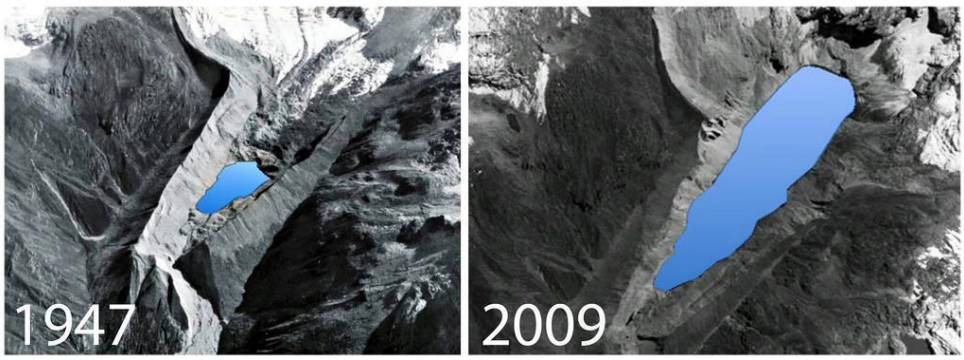
Appendix BK 1

Thus far, the defendant has not contested these facts, which are based on the results of a large number of studies, including those summarised in Appendix K 7 (p. 24 et seqq.), as well as the *Rabatel* study (Appendix B1) referred to above. Due to these developments, the lake volume is roughly 34 times larger today than in 1974. The following schematic overview is presented again here to clarify the process that Emmer,

the expert witness, has described in detail in Appendix K 37:



This model, created by the University of Texas (Appendix K7) and currently accessible in an interactive format at http://landscapeteam.maps.arcgis.com/apps/MapJournal/index.html?appid=7bfd8b154237410a8927157296b5ea0c



enables a true comparison between conditions in 1947 and 2009. The 2009 volume (17.3 million m^3) is almost equal to the volume measured in 2016 (17.4 million m^3), which has already been reduced through continuous pumping measures.

The mass balance is not the same as the loss of surface area, which can be detected by aerial or satellite images and has been evaluated accordingly. From a scientific perspective, the mass balance is not necessary for the causal chain relevant here.

Evidence: Expert witness Christian Huggel

Should the court also consider the specific (quantified) loss of mass of the glacier or glaciers to be of evidentiary value, an expert can estimate or assess this in an

Expert opinion

Paragraph 103 and 104:
Here, the defendant introduces two new studies to show that local extremes may be responsible for the loss of surface area.

The research submitted refers to the extremely short-term and local influences of the PDO [Pacific Decadal Oscillation] and ENSO [El Niño Southern Oscillation] as case studies in Ecuador and Bolivia. The results are therefore not transferable to Huaraz; in these extreme events, precipitation and temperature can fluctuate dramatically.

Evidence: Expert witness Christian Huggel
Expert witness Prof Mojib Latif
Expert report

It should be recalled, however, that the plaintiff's burden of proof relates solely to the role of the defendant's GHG emissions as a partial cause of the temperature increase and the negative impact on the security of the plaintiff's property at the end of the causal chain.

The defendant bears the burden of proof for any contributory partial causes (volcanic eruptions, changes in solar activity, El Niño, etc.) that are cited by the defendant and lie outside the plaintiff's scope of responsibility.

Incidentally, the fact that external causes may have an effect would not change the fact that, without the causal contribution of the defendant's emissions, the rise in temperature since the middle of the nineteenth century and the impact on the plaintiff's property at the end of the causal chain would be correspondingly lower.

Paragraph 106:
The report referred to here, which was prepared by the Peruvian competent authority (INAIGEM), does not contain any statement that climate change is not the primary driver of glacier recession. The report specifically addresses the Yanapaccha and Shallap glaciers, not the Palacaraju glacier. The plaintiff has not fundamentally denied that soot deposits should be considered as an additional factor.

Huggel, the expert, declared on the basis of his expertise:

> In my opinion, it is clear that the observed rise in temperature is one of the most important reasons for the region's documented glacier shrinkage but is not the only factor accounting for it.
> **Appendix BK 1**

In the plaintiff's view, this is sufficient to meet the standards of proof for contributory causation, but evidence has been offered in the event that this is not the case.

Paragraph 108:

Contrary to the defendant's opinion, the influence of soot deposits on the melting of the glacier is not a standalone 'dynamic feedback process', but rather an additional partial cause, the 'theoretical elimination' of which (*condicio sine qua non)* might have lessened the increase in the volume of water caused by GHG emissions/global warming and the resulting danger to the plaintiff's property.

Paragraph 111 et seqq.:

The defendant here suggests, in essence, that the volume of the lagoon is influenced more by phenomena with heavy precipitation, like El Niño, than by the decline of the glaciers situated above it. According to the defendant, the volume is currently decreasing.

This argument overlooks the fact that only the massive recession of the glaciers has allowed the lake to expand to this dangerous level; the existing drainage systems could have combatted the effects of El Niño. Please refer to the submission of 29 September 2016, p. 27 et seqq., and Appendix K 37.

In addition, the court must be informed that there is no new quantitative study vis-à-vis the bathymetric measurement of the water volume in Appendix K 36. The INAIGEM annual report referred to by the defendant does not constitute one such quantitative study; instead, it makes explicit reference to the seasonality of El Niño and the drought period.

The defendant also alleges fluctuations that are, at this point, unverifiable and thus contested (60,000m^3 'on some days', para. 115; rise of 18cm, corresponding to 92,618m^3, para. 116), but does not correlate these with the status of the volume ('before climate change') in 1974 (namely 0.5 million m^3) and refers only to 'significant' fluctuations without presenting any actual absolute volume.

Paragraph 117:

Here, the defendant tries to suggest that its causal contribution is legally irrelevant because there are natural fluctuations in the water level and volume of the lake. The plaintiff does not dispute that, due to the influence of various factors, the water volume of Lake Palcacocha is subject to natural fluctuations. This is partly due to the glacier runoff and the lift pumps. However, the defendant overlooks the fact that the plaintiff's claim refers to a permanent reduction. The defendant also tries again to invert the plaintiff's approach of holding the defendant responsible only for the emissions for which it is responsible. Because the plaintiff is not taking action against all causal contributors at the same time, the causal contribution claimed here is relatively small, but not insignificant. However, on a local level, the influence of the climate change to which the defendant has contributed is not insignificant.

In addition, the natural fluctuations are not the critical factor in the increased flood risk, which is the result of the accelerated glacier melting partially caused by the defendant. What is significant is that, due to the global warming to which the defendant has contributed, the overall water volume of the lagoon is much higher than it would be without global warming; therefore, the threat to the plaintiff's property would be reduced substantially if the defendant's contribution to global warming were eliminated (*condicio sine qua non*). Even if it one accepted the assertion (which the plaintiff contests) that the volume of water increases by 92,618m^3 (para. 116) in one day, it is obviously relevant what initial volume this increase affects. At a level of 0.5 million m^3, as in 1974, this increase would be harmless, but at the 2016 level of 17.4 million m^3, it is not.

Evidence (again): **Appendix K 37**
Expert witness Emmer
Expert opinion

Paragraph 119:

An error of reasoning is particularly clear in the argument in paragraph 119, in which the defendant argues that it is no longer possible to reduce the volume of water by the proportion attributed to the defendant as proposed because of the reduction that has taken place in the meantime. The change in the volume of water is not due to a circumstance attributable to the defendant, but to 'external' influences and changes that do not offset the defendant's share in the ongoing property disturbance. The defendant itself has argued that reducing the volume only by an amount proportional to its causal responsibility would not eliminate the risk of flooding. The plaintiff does not contest this assertion.

Paragraph 120:
The risk to the plaintiff's house remains unchanged. Please refer to the (binding) determinations reached in the decision of the court of first instance. The flood risk is imminent. On this point, see above.

Evidence: As before.

5. Emission contributions are allowable as a basis for the causal contribution

The defendant's statements in paragraph 123 et seqq. are based on the assumption that the standard of full proof is also applicable with regard to the causal contribution. This was already addressed above. With regard to the causal contribution, section 287 of the ZPO applies.

The defendant does **not** deny that its power plants are responsible for a substantial share of total historical GHG emissions. It has been proved with sufficient certainty that the defendant's contribution to total historical emissions is 0.47% and 0.41% as measured against the global temperature increase.

In 2017, a new, expanded study was published that updates the so-called Heede study. The Carbon Majors Report 2017 (CDP) is presented here.

Appendix BK 6

This study was prepared by the Climate Accountability Institute and continues the work of scientist Rick Heede (Appendix K 24). The study attributes a total of 71% of global industrial emissions since 1988 to only 100 fossil fuel producers, including the defendant.

The study assesses both direct and indirect emissions as follows. Scope 1 emissions—the emissions relevant to these proceedings—are direct emissions (from self-consumption of fuel). Scope 2 emissions are emissions from energy supplied by third parties (purchased energy, such as electricity or district heating). Scope 3 emissions are indirect emissions (from up and down the supply chain).

For Scope 1 and Scope 3, 0.5% of global CO2 emissions are reported for the defendant. For Scope 1 emissions (i.e., those relevant to the partial causality in the present case), the defendant's contribution remains at 0.47% only for the period from 1988 to 2015 (due to the lower calculation for Scope 3 emissions).

The defendant has not disputed the fact that the data on which the Heede study is based correspond to what the defendant actually emitted

from its plants. (This percentage is still valid for the current emission contributions (see appendices K 22- K 27).)

In the submission of 29 September 2016, the plaintiff explained that it is reasonable to base the defendant's causal share on this contribution, even in the presence of other causes and sources of GHGs (El Niño fluctuations, etc.) cited by the defendant. In paragraph 126, the defendant fails to realise that the purpose of the claim is not to obtain a remedy for seasonal fluctuations.

On this point, the plaintiff offers, once again, the

Expert testimony of Prof Dr Mojib Latif, b. b.
Expert report

The defendant does not address the statements relevant to this issue in Appendix K 31.

In paragraph 129 et seqq., the defendant addresses the explanations (which, in the plaintiff's view, exceeded his obligation) in the submission of 29 September 2016, which established that even the *'temperature response'* to the defendant's causal contribution (i.e., its contribution to the observed (!) increase in temperature) is scientifically attributable to a source.

The plaintiff used model-based calculations of country contributions and offered further evidence to support this assertion. He therefore did not refer solely to appendices K 30 and 31, as the defendant suggests in paragraph 131.

The plaintiff contests the defendant's contention in paragraph 130, according to which this reference should in principle be inadmissible because climate models are used to support this point. The defendant's argument refers to various aspects of climate modelling that are not directly related to the facts of the case. In particular, it remains unclear why the defendant focusses on the role of climate models if the facts of the case are based on the effects of climate change already observed, not on modelled or projected warming. A combination of evidence from observation data and evidence from modelling is available for the observation period.

In addition, the argument is based on selective and obsolete citations and leaves unaddressed essential findings of the IPCC. The reports of the IPCC provide a comprehensive record of the most up-to-date scientific data, and the Summary for Policymakers (Appendix K 18), in particular, obtained line-by-line approval from delegates of the

member states, including the Federal Republic of Germany.

In addition, models, forecasts, and statistical methods for establishing cause and effect are not foreign to German jurisprudence; they ultimately represent expert testimony with technical reinforcement. On the basis of the expert statements presented, the defendant's causal contribution to global climate change amounts to 0.47%,

Appendix K 24 and BK 6
Expert opinion

which provides grounds for the main claim as filed—and is at least a sufficient basis for estimation to satisfy the criteria of section 287 of the ZPO. If this is not the case, the plaintiff requests judicial notification to this effect.

Contrary to the defendant's assertions, the Summary for Policymakers of Working Group I of the IPCC leaves no doubt regarding the suitability of climate models to represent global warming. Specifically:

> Climate models have improved since the AR4 [IPCC Fourth Assessment Report: Climate Change 2007]. The models reflect the patterns and trends in the Earth's surface temperature, observed over many decades on a continental scale, including the intensified warming since the mid-20th century and the cooling immediately following large volcanic eruptions (very high confidence).' (Appendix K 18, p. 13)

Furthermore, in paragraph 131 et seqq., the defendant overlooks the fact that the plaintiff believes that a separate model to calculate the causal contribution is **unnecessary** due to the distribution of the burden of proof and the fact that the causal relationships have been established effectively.

In Appendix K 30, Dr Huggel merely emphasises that a model of this kind faces technical challenges. However, it is in no way technically impracticable to calculate the causal contribution with regard to the concrete danger and thereby scientifically substantiate the expert statements (which the plaintiff believes to be sufficient). Attributions of this kind have been made before, for example in the above-mentioned Marzeion study (BK 5)—even with regard to extreme weather events, as in the work of Stott et al.

> *Stott,* P. A. et al. (2015), Attribution of extreme weather and climate-related events, *Wiley Interdiscip Rev Clim Change*, *7* (February), 23–41, doi:10.1002/wcc.380.

(The latter is not included due to a lack of direct relevance but can be submitted immediately.)

Huggel, the expert witness, provides another confirmation of this in Appendix BK1 (see above, in the reply to paragraph 98 of the defendant's submission).

Whether a report of this kind is required as evidence is to be determined by the adjudicating court. The plaintiff defers to its judgment.

The plaintiff responds as follows:

Paragraph 130:

With regard to the statement at the end of paragraph 130, according to which there are 'no general laws describing biochemical processes (citation: Latif)', the defendant misinterprets the state of climate science and again attempts to present the interrelationships as vague and imprecise. The fact is that scientists have extensive knowledge of the CO2 balance. This knowledge is the basis for the core message of the IPCC: that nearly half of the anthropogenic emissions remain in the air for roughly 100 years, with the rest absorbed by the land and sea. This has been established on the basis of measurements. There is no need to know the exact chemical and biological processes involved.

Evidence: Expert witness Mojib Latif, b.b.
Expert opinion

Paragraph 134:

The points cited here are not relevant to the facts of the case, because the case does not concern predicted future warming; it concerns warming that has already been observed and the resulting emissions of GHGs. The IPCC Summary for Policymakers is unambiguous with regard to the relationship between GHG emissions and the resulting changes in the planet's radiation balance:

> Overall anthropogenic radiative forcing is positive and has led to the absorption of energy by the climate system. The greatest contributor to total radiative forcing is the rise in atmospheric CO2 concentration since 1750 (see illustration SPM.5). (Appendix K 18, p. 11)

Furthermore, the role of feedback mechanisms is more significant for an understanding of expected warming than of GHG emissions. However, such mechanisms by no means *cause* warming.

The IPCC is also clear regarding the role of natural climate variability in observed warming. In the IPCC reference period (1986–2005), the temperature rose 0.6°C relative to pre-industrial levels; natural climate variability accounted for between -0.1°C and 0.1°C.

Evidence: As before.

By contrast, the defendant suggests in paragraph 135 that, because the ranges are so wide, it is generally impossible to reach a clear conclusion.

Paragraph 138:

The defendant states that the IPCC does not specify the *temperature response* because it is impossible to do so. This argument is incorrect. The IPCC states unambiguously that the human impact on the climate system is clear. In addition, the most recent Assessment Report (Annex K 18) states that anthropogenic factors have been the main cause of global warming since the middle of the twentieth century. This is precisely what is taken into account in Appendix K 31 and in the statement on the attribution of the causal contribution.

With regard to this point, the defendant is ultimately concerned with demonstrating that scientists are not certain of their assessments, which would prevent the court from reaching a decision in any one case. Based on standard established in section 286 of the ZPO, the defendant's allegation is incorrect. Section 286 refers

> deliberately to the subjective criterion of the judge's discretion and thus excludes objective criteria (and, in particular, any recognition of scientific truth as a measure). Munich Commentary ZPO, 5th edition 2016, *Prütting* section 286 marg. no. 1.

In a decision on an individual case, it is always a question of whether the facts can be proven sufficiently to convince the court. In the plaintiff's view, this objective has been achieved here, despite the novelty of the specific case.

Paragraph 140–143:

Here, the defendant repeats the (incorrect) argument with regard to the so-called hiatus (defendant's submission, paragraph 90). Among climate scientists, it is common knowledge that (on an annual or multi-year timescale) the global warming trend is strongly influenced by natural climate variability. However, on a multi-decadal timescale, the role of variability averages out, and the anthropogenic warming signal is clear. For this reason, the IPCC report does not list degrees of warming on a timescale of less than 20 years.

The role of natural climate variability has also led the opposing party to refer, erroneously, to

a 'decline in warming' between 1998 and 2012. The defendant's wording (a 'decline in warming') is misleading, because, while the warming slowed during this period, temperatures did not cool down by any means.

Since then, the warming trend has accelerated significantly, including with respect to natural climate phenomena such as the PDO and El Niño. There is no mention of this fact in the argument of the opposing side.

Evidence: As before.

Nor is it to be expected that the relevant climate model simulations of the IPCC will 'predict' short-term warming trends. These simulations model the climate from pre-industrial times to the year 2100. Due to the nature of the climate system, the phases in which relevant cycles of natural variability occur are represented differently over time. When these phases are taken into account in comparisons of model simulations and observations, the model simulations do not deviate systematically from the observations.

> *Marotzke*/*Forster* (2014), Forcing, feedback and internal variability in global temperature trends, *Nature*, *517* (7536), 565–570, doi:10.1038/nature14117.
>
> (The latter is not included due to a lack of direct relevance but can be submitted immediately.)

The most recent survey article on this subject from *Nature* magazine has already been submitted (Medhaug, Appendix BK 4).

Paragraph 145:

Again, the defendant is unable to explain persuasively why uncertainties in model predictions for *observed* changes are of overriding relevance. It is agreed that models are suitable for investigating physical causal relationships. Furthermore, the points of uncertainty listed above do not call into question the *causal role* of GHG emissions in the observed heating.

6. Adequacy

In paragraph 146 et seqq., the plaintiff defends the opinion of the court of first instance, according to which contributory causation is insignificant and thus insufficient evidence of causality. This is a legal question that has already been addressed in the grounds of appeal.

According to the theory of adequacy, causes are to be regarded as irrelevant if they are only apt to cause the damage under *highly unusual* circumstances that are *unpredictable*, even to an optimal observer.

That is not the case here.

In addition, the plaintiff bears the burden of proof only for the fact that there is a disruption to his property, caused, in part, by the defendant. The defendant must prove that the contribution to the disturbance attributable to it remains below the significance threshold. Accordingly, the plaintiff is not required to define the threshold that the defendant wishes to establish in paragraph 150. However, it is also quite simply unacceptable to assume that the present causal contribution, which is comparable to that of an entire country of 17 million inhabitants—the Netherlands—is legally 'insignificant'.

The share of global CO2 emissions contributed by the transport sector (23%), which the defendant includes in paragraph 151, is not applicable to general historical emissions.

With regard to paragraph 152, the plaintiff reiterates that the defendant has long been aware of the risk of the consequences of CO2 emissions (statement of claim, p. 19). It should not have been unforeseen by the defendant that a claim would be filed asserting contributory causation; it is in fact a logical consequence of the progressive effects of anthropogenic climate change.

7. Duty of care is not a constituent element of the claim

The defendant does not recognise the difference between liability for a disturbance caused by a party's actions or omissions [*Handlungsstörung*] and liability based simply on the party's position as the owner or occupier of the property on which the disturbance takes place [*Zustandsstörung*]. It is not relevant to the plaintiff's claim whether the defendant, by emitting the GHGs that have caused the disturbance to the plaintiff's property, has 'failed to fulfil an obligation' or violated a duty of care.

The plaintiff's claim for the abatement or removal of a disturbance (provision for which is made in section 1004 of the BGB) is not based on the unlawfulness of the respective act, but on the unacceptable disturbance to the claimant's property, i.e., the unlawfulness of the outcome.

The defendant is liable as a *Handlungsstörer* for a causal chain that was set in motion by causes including its power plants and for which its role in the resulting property damage is adequately causal. The violation of a 'duty of care' is not a prerequisite here. Please see also the remarks on this point in the submission of 11 July 2016, p. 17 et seqq.

The defendant once again cites the case-law that the plaintiff already addressed in the previous submission. The other decisions cited by the defendant are also not grounds for the conclusions that it hopes to establish:

The case of the OLG Düsseldorf,

> OLG Düsseldorf, MDR 2014, 156,
> Decision of 23 July 2013 - I-9 U 38/13 - juris

concerned the duty of care of a *Zustandsstörer*, namely the owner of a property on which a 200-year-old oak tree stood. The headnote makes clear that, even for the 'natural events' invoked by the defendant, there is a duty of care and thus the potential for an actor to qualify as a disturber under the law. That case is not applicable to the present one.

The case of the OLG Nuremberg

> OLG Nuremberg, NJW-RR 2014, 792
> Decision of 14 January 2014 - 4 U 2123/13, juris

also concerned a risk that had arisen entirely without the active involvement of the defendant in that case, namely the activities of a beaver. The plaintiff does not understand how that case is comparable to the defendant's deliberate emissions.

In addition, the decision of the OLG Düsseldorf cited by the defendant,

> OLG Düsseldorf, decision of 26 September 2013
> I-13 U 38/13 -, juris

does not reveal any other useful content, although it does establish that, without the intervention of the property owner, mere root growth are sufficient for a *Zustandsstörung*. This decision also expressly notes that, because the party that remedies the property disturbance in effect relieves the disturber of its duty, that party can oblige the disturber to reimburse the necessary costs in accordance with section 812(1) of the BGB.

Similarly, no additional relevant information can be drawn from the case of the adjudicating court,

> OLG Hamm, decision of 27 October 2016 - I-5 U 83/15 -, juris

which makes clear that the owner of a tree whose roots affect sewage pipes on another plot of land is a disturber: 'The fact that the growing roots are fundamentally natural events does not preclude the owner from functioning as a disturber.'

Likewise, the decisions on 'normal operation', cited in paragraph 158, do not substantiate the defendant's argument. The legal opinion expressed there, according to which approval of the operation protects against claims in general, is already incompatible with section 906 of the BGB and section 14 of the Federal Immission Control Act [*Bundes Immissionsschutzgesetz* (BImSchG)]. The defendant has taken out of context the citation on 'proper operation' in the decision of the BGH

> BGH, NJW 2004, 1037
> Decision of 12 December 2003 - V ZR 98/03 -, marg. no. 10, juris

This statement was solely concerned with the allocation of areas of responsibility in the case of natural events occurring in the context of a *Zustandsstörung* (owner–tree–roots).

8. No limitation period

The argument in the submission of 11 July 2016, p. 19, remains unchanged. The claim is not time-barred because the defendant continues to release emissions; therefore, a limitation period cannot even be set in motion.

Legal counsel
Dr Roda Verheyen