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INTANGIBLE LOSSES, DAMAGES AND AT-RISK SETTLEMENTS: THE EXTENT OF CAUSALITY AND BURDEN OF PROOF FOR CLIMATE RELATED LOSS AND DAMAGE IN THE FIJI ISLANDS

Dan Frederick Orcherton
School of Science & Technology, University of Fiji, Saweni Campus, Lautoka, Fiji
Email: orchertonandsudario@gmail.com | ORCID: 0000-0003-0859-2592

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ABSTRACT

In this article, a plethora of social, cultural, legal and policy related remedies for harm caused by climate related loss and damage (L&D) were examined, particularly in rural and remote Fiji Islands. The meaning of loss and damage, and its relationship to climate mitigation and adaptation, was discussed. The concept of causality and attempt are considered to expose some criteria that the law uses to test causation in the hope to subject these to a much-needed discussion of climate change and causation affecting international law, domestic law, and climate science. A probabilistic event attribution (PEA) is explored having crucial implications in the development of PEA. When vulnerabilities and thresholds are known, changing risks can be calculated *ex ante* and, therefore, changing risks can be forecasted. The improvement of the methods allows geographically very specific events to be anticipated and, thus, appropriate adaptation measures can be designed. It is considered (at a conceptual level) how those harmed by loss and damage in Fiji from human-induced climate change may pursue remedies against those who have contributed to the harm. Finally, this article explores what that evidence needs to be (extent of causality and burden of proof) for loss and the damages to be awarded. It is concluded by highlighting the values of probabilistic event attribution (PEA), and how vulnerabilities in Fijian communities continue to be a deep concern. Further work needs to be done with respect to social, cultural, and biological interconnectivity that concretely underlines the importance of climate change and how it diminishes well-being and cultural integrity of Indigenous people by affecting endemic plant species. Disaster Risk Reduction (DRR) needs to be cognizant of social and cultural implications of forced migration. Causality and burden of proof within the legal context has its built-in complexities and, hence, it needs further research.

Keywords: Loss and damage; Burden of proof; Probabilistic event attribution; Vulnerabilities; Fijian communities; Climate change

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Intangible Losses, Damages and At-Risk Settlements: The Extent of Causality and Burden of Proof for Climate Related Loss and Damage in the Fiji Islands

1. INTRODUCTION

The Fifth Assessment Report of Intergovernmental Panel on Climate Change (IPCC) emphasizes that climate change is one of the greatest threats to human security because it undermines livelihoods, compromises cultures and individual identity, and disrupts the ability of States to provide the conditions necessary for human security[1].

The South-West Pacific region (Figure 1) is increasingly being recognised as one of the most immediately vulnerable regions in the world to potential increases in mass migration, displacement and relocation of people due to climate change impacts[2,3,4]. Loss and damage (or L&D) in low-lying island States in the Pacific Islands is integrated into a climate risk management framework proposed by Mechler and Schinko (2016) drawing on Nurse et al. (2014)[5] and UNFCCC (2015)[6]. This framework has been applied to the group of SIDS (Small Island Developing States) globally (see Schinko and others, 2018)[7]. It focuses on current risk exposure and future risk scenarios where the intolerable risk space is seen as being relevant already today and becoming even more critical in the medium to longer term (2030–2040 and 2080–2100). It is discussed how, for some Pacific-SIDS, there are already cases where communities find themselves impacted by intolerable climate-related risk, and where the risk management options suggested in the figure 1 are already being deployed. Small atoll countries, such as Kiribati and Tuvalu, have provided vivid images of the possible inundation projected for the future[8,9]. The atoll

1 Adger, W. N. et al., 'Human Security', in: C. B. Field et al. (eds.), Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects (2014). Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge and New York: Cambridge University, 2014) pp.755-791 <https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap12_FINAL.pdf> accessed 17 March 2023.

2 Campbell, J., 'International Relocation from Pacific Island Countries: Adaptation Failure? Environment, Forced Migration & Social Vulnerability' (2008) International Conference, Bonn, Germany, 9-11 October 2008.

3 McAdam, J., 'Climate change, forced migration, and international law' (2012) Oxford Scholarship Online, May 2012.

4 Weir, T. and Virani, Z., 'Three linked risks for development in the Pacific Islands: climate change, disasters and conflict' (2011) 3 Clim. Dev., 193–208.

5 Nurse, L. A. et al. (eds.), 'Small Islands', in V. R. Barros et al. (ed.) Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, 2014), pp.1613-1654.

6 UNFCCC, 'Report on the Structured Expert Dialogue on the 2013-2015 Review' (2015) Decision FCCC/SB/2015/INF.1 http://unfccc.int/resource/docs/2015/sb/eng/inf01.pdf accessed 25 January 2016.

7 Schinko, T. et al., 'The Risk and Policy Space for Loss and Damage: Integrating Notions of Distributive and Compensatory Justice with Comprehensive Climate Risk' (2018) 380 Journal of Risk and Management, cited in Mechler, R. et al. (eds), 'Loss and Damage from Climate Change: Concepts, Methods and Policy Options' (Springer, 2018) pp.83-110.

8 Connell, J., 'DR16: Small Island States and Islands: Economies, Ecosystems, Change and Migration' (2011) Migration and Global Environmental Change Foresight, Government Office for Science, UK Government.

9 Mortreux, C. and Barnett, J., 'Climate Change, Migration and Adaptation in Funafuti, Tuvalu' (2009) 19 (1) Global Environmental Change 105-112.

countries have also been vocal about the plight of island nations[10], in particular in the United Nations Framework Convention on Climate Change (UNFCCC) negotiations through the Alliance of Small Island States (AOSIS) commanding significant media attention[11].

The goal of this article is to conduct a brief, but thorough, integrated and critical review of several examples of loss and damage in at-risk settlements. This review will also examine some characteristics of the extent of causality and burden of proof for climate related loss and damage in the Fiji Islands.

Figure 1: 20 SIDS (Pacific Islands Small Island Developing States). Adapted from: <http://www.scidev.net/global/water/feature/ocean-science-development-sids-facts-figures.html> (Grimms, 2014)[12]

2. METHODOLOGY

This review was carried out through the use of a qualitative scoping review in addition to an in-depth online literature search. As part of this process, a preliminary assessment of the available literature on a specific

[10] McAdam, J., 'Climate Change, Forced Migration, and International Law' (2012) Oxford Scholarship Online, May 2012.

[11] Handmer, J. and Johanna Nalau, J., 'Understanding Loss and Damage in Pacific Small Island Developing States' (2019), in R. Mechler et al. (eds.), 'Loss and Damage from Climate Change, Climate Risk Management, Policy and Governance' <https://doi.org/10.1007/978-3-319-72026-5_15> .

[12] Grimms, S. 'Ocean science for development in SIDS: Facts and figures' (2014). SiDevNet. <https://www.scidev.net/global/features/ocean-science-development-sids-facts-figures/> accessed 12 January 2023.

subject was carried out with the intention of determining the breadth of the literature, its most important concepts, and the areas where additional research is needed. On the topic of climate change in the South Pacific, particular literature was gathered by searching electronic databases (e.g. IPCC, NOAA, Australian Climate Change Centre, and Climate Scale[13]. An additional literature review and search of studies on loss and damage and at risks settlements in Fiji was also done. This search included pertinent literature from the USP-UniFiji and FNU Library, TEK literature searches, and the Web of Science database that focused on the extent of causality and the burden of proof. After that, the information gleaned from the literature review and the qualitative scoping review was subjected to thematic coding with the help of the Nvivo qualitative analysis software. The research covered a wide range of topics, including climate change, environmental law, loss and damage; the burden of proof; probabilistic event attribution; climate change impacts and vulnerabilities within the context of Fijian communities.

The results of the review provided a comprehensive and systematic search strategy to identify all relevant literature, using an integrative or critical review approach, to evaluate, critique, and synthesize the literature on a research topic in a way that makes it possible for new theoretical frameworks and perspectives to emerge. The purpose of this review is to create initial or preliminary conceptualizations and theoretical models of developing or novel conceptual or theoretical insights. Considering that loss and damage is a developing topic, this review's objective is to make these models.

3. LOSS AND DAMAGE POLICY INSIGHTS IN THE PACIFIC ISLANDS

On the policy end, intangible loss, damages and at-risk settlements that are linked to the concepts of L&D, are complex and interrelated. Tschakert et al. (2019)[14] eloquently describe this relationship as a:

> *"situated and socially engaged science of loss arising from climate change takes people's lived experiences with risk and harm as its fundamental starting point. It foregrounds what losses occur, where and how, which of these losses matter most to people and why and whether or not such losses are considered acceptable and potentially reversible. However, obtaining such insight is difficult if the many things people value, across space and time, are intangible, i.e. they cannot and perhaps should not be quantified, and hence are often overlooked and omitted. This is the case, for instance, for the symbolic and affective dimensions of culture and place, such as sense of belonging, personal and collective*

[13] Climate Scale, 'High Resolution Climate Data for Climate Change Risk Assessments.' (2023). <https://www.climatescale.com/?gclid=Cj0KCQjw_r6hBhDdARIsAMIDhV9WAoRGFXFSP6SdDfMXartfiaaZHfcTBMc1ImFdTOd9jq7N9ogyGokaAld3EALw_wcB> accessed 12 January 2023.

[14] Tschakert, P. et al., 'One Thousand Ways to Experience Loss: A Systematic Analysis of Climate-Related Intangible Harm from Around the World' (2019) 55 Global Environmental Change 58-72.

> *notions of identity, and ways of knowing and making sense of the world, all of which are already undermined by climate change"* (p.1).

It is often necessary for law and policy makers on both the domestic and international levels to pay attention to the key L&D and related policy insights. It is highly unlikely that L&D will be adequately equipped in their current form to respond to claims to remedy harm caused by L&D within the existing legal system that is in place in Fiji. The legal system in Fiji is intricate, and it will be difficult for it to develop over time in such a way that it can correctly identify appropriate claimants, appropriate respondents, appropriate remedies, and actionable wrongs. Different legal systems will make different choices on these critical issues.

According to Seck and Doelle (2019), attempts to address loss and damage (L&D) in the UN climate system effectively and provide for pathways to address associated harms have so far been unsuccessful[15],[16]. While these initiatives are still ongoing, it is becoming increasingly obvious that it will be difficult for a wide range of international regimes and domestic legal systems to react to demands for adequate remedies for persons hurt by L&D.

It has been suggested in the literature, however, that the phrase 'loss and damage' recognizes two categories of harm:

1) permanent harm, or irrecoverable 'loss', such as the loss of landmass from sea level rise;
2) reparable or recoverable 'damage', such as shoreline damage from storms[17,18,19].

Other ways, the concept of L&D has been delineated is between economic and non-economic L&D, and between slow onset and extreme weather events[20,21]. The focus has been on harm caused by human-induced

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15 Siegele, L., 'Loss and Damage (Article 8)' (2017), in D. Klein et al. (eds.), The Paris Agreement on Climate Change: Analysis and Commentary (Oxford University Press, Oxford, UK, 2017) 224-238.

16 Lees, E., 'Responsibility and liability for climate loss and damage after Paris' (2017) 17 (1) Climate Policy 59-70.

17 Climate Development and Knowledge Network (CDKN), 'Framing the loss and damage debate: A conservation starter'. International Centre for Climate Change and Development (ICCCD), Germanwatch, Munich Climate Insurance Initiative (MCII), & United Nations University – Institute for Human and Environment Security (UNU-HES) (2012). <https://germanwatch.org/sites/germanwatch.org/files/publication/6673.pdf> accessed 23 December 2022.

18 Morrissey, J., & Oliver-Smith, A., 'Perspectives on non-economic loss & damage: Understanding values at risk from climate change'. Retrieved from Loss and Damage in Vulnerable Countries Initiative (2013). <http://www.eldis.org/document/A71918> accessed 18 February 2023.

19 Nishat, A., Mukherjee, N., Roberts, E. & Hasemann A., 'A range of approaches to address loss and damage from climate change impacts in Bangladesh' (2013) <https://www.weadapt.org/sites/weadapt.org/files/2017/november/5555b2dbe48b47069.pdf> accessed 18 February 2023.

20 Fankhauser, S., Dietz, S., & Gradwell, P., 'Non-economic losses in the context of the UNFCCC work programme on loss and damage (policy paper)' (2014). London, UK: Centre for Climate Change Economics and Policy – Grantham Research Institute on Climate Change and the Environment.

21 Stabinsky, D. & Hoffmaister, J.P., 'Loss and damage: Defining slow onset events' (2012) (Briefing Paper 3).

climate change itself. A more controversial category of harm associated with climate change not clearly falling within the definition of L&D is harm caused by response measures, including by mitigation efforts, adaptation, and geoengineering.

According to Olsen et al. (2022)[22], however, a significant step in accepting losses and damages as a legitimate claim, though still contested, was the establishment of the Warsaw International Mechanism (WIM) for Loss and Damage. The (WIM), in 2014, aimed at "promoting the implementation of approaches to address loss and damage associated with the adverse effects of climate change". More recently, political demands for compensation for loss and damages have again been raised at COP26[23]. Even if the WIM covers L&D from both extreme events and slow onset events, such as sea level rise, the funding opportunities are almost exclusively for extreme events[24,25]. Parker, in turn, argued that this is an important reason why attribution science has become increasingly popular in recent years[26]. Before the WIM work process started in 2011[27], few scientific articles were published on attribution of extreme events to climate change but increasing rapidly from 2013 onwards. L&D in COP27 (Sharm-el-Sheikh, Egypt) was set against a difficult geopolitical backdrop. COP27 resulted in countries delivering a package of decisions that reaffirmed their commitment to limit global temperature rise to 1.5^{o}C above pre-industrial levels. The package also strengthened action by countries to cut greenhouse gas emissions and adapt to the inevitable impacts of climate change, as well as boosting the support of finance, technology and capacity building needed by developing countries (UNFCCC, 2022).[28,29]

<http://unfccc.int/files/adaptation/application/pdf/tp7_v03_advance_uneditted_version.pdf > accessed April 22, 2023.

22 Olsson, L. and others, 'Ethics of Probabilistic Extreme Event Attribution in Climate Change Science: A Critique' (2022) Earths Future 10 (3) <https://doi.org/10.1029/2021EF002258>.

23 Kaplan, S., 'The U.N. climate summit will take on 'adaptation, loss and damage' Monday. Here's what you need to know' (2021) The Washington Post <https://www.washingtonpost.com/climate-environment/2021/11/07/cop26-glasgow-climate-loss-damage > accessed 10 February 2023.

24 Gewirtzman, J., et al., 'Financing loss and damage: Reviewing options under the Warsaw international mechanism' (2018) 18 (8) Climate Policy 1076–1086. <https://doi.org/10.1080/14693062.2018.1450724>

25 Singh, C., et al., 'Losses and damages associated with slow-onset events: Urban drought and water insecurity in Asia' (2021) 50 Current Opinion in Environmental Sustainability 72–86. <https://doi.org/10.1016/j.cosust.2021.02.006>.

26 Parker, H. R., et al., 'Implications of event attribution for loss and damage policy' (2015) 70 (9) Weather 268–273. <https://doi.org/10.1002/wea.2542>.

27 Schäfer, L., & Kreft, S., 'Loss and damage: Roadmap to relevance for the Warsaw international mechanism-first version' (2014) <www.germanwatch.org/en/8366> accessed 20 December 2022.

28 UNFCCC, 'Creating a specific fund for loss and damage marked an important point of progress, with the issue added to the official agenda and adopted for the first time at COP27' (2022).

29 UNFCCC, 'COP27 Reaches Breakthrough Agreement on New "Loss and Damage" Fund for Vulnerable Countries' (2022). <https://unfccc.int/news/cop27-reaches-breakthrough-agreement-on-new-loss-and-damage-fund-for-vulnerable-countries> accessed 30 December 2022.

4. VULNERABILITY OF SMALL ISLAND DEVELOPING STATES AND FIJI

Fiji has extremely high exposure to tropical cyclones according to a recent World Bank report entitled, "Climate Risk Country Profile"[30]. Fijian islands experience the direct or indirect effects of cyclones on an annual basis, including frequent occurrences of multiple strikes in one year. Cyclones usually occur during the November-April wet season, and are less common during El Niño periods. Cyclones frequently result in loss of life and cause significant economic damage, which has hindered economic growth. Particularly, Fiji is exposed to rising sea levels, floods, and landslides. Fiji is one of the world's most vulnerable nations to climate change and climate-related disasters. Fiji has ratified the Paris Climate Agreement and submitted its Updated Nationally Determined Contribution (2020), which emphasizes the nation's need for external support to meet the high economic costs of mitigation and adaptation. Fiji submitted its Third National Communication to the UNFCCC (TNC) in 2020[31], extensively documenting the risks climate change presents to its communities and economy. Key vulnerabilities include its subsistence agriculture sector, its coastal and marine resources, including coral reefs, its freshwater resources, and its land management and uses. In 2017, the Government of Fiji, World Bank Group, and the Global Facility for Disaster Reduction and Recovery (GFDRR) completed an extensive assessment of Fiji's vulnerability to climate change[32].

Takamura (2020)[33] indicated that when small island states – the most affected by climate change but contributing the least thereto – eventually wish to bring a *claim for compensation* for damage caused by climate change vis-à-vis a large emitting State, several legal barriers would stand in the way of their success. The United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol lack clear rules on compensation for damage caused by climate change. These States may gain compensation by invoking State responsibility for breach of international obligations by other States, whether in treaties or customary law. However, it is not easy to claim successfully for such responsibility because of the very nature of climate change: difficulties exist in proving

30 World Bank, 'Climate Risk Country Profile, Fiji.' <https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15854-WB_Fiji%20Country%20Profile-WEB.pdf> accessed 19 December 2022.

31 Government of Fiji, 'Third National Communication Report to the United Nations Framework Convention on Climate Change (2020) <https://unfccc.int/sites/default/files/resource/Fiji_TNC%20Report.pdf> accessed 30 December 2022.

32 Government of Fiji, 'Climate Vulnerability Assessment Making Fiji Climate Resilient' (2020). The World Bank Group, GFDRR. <https://www.gfdrr.org/sites/default/files/publication/Making%20Fiji%20Climate%20Resilient%20-%20Full%20Report_0.pdf> accessed 11 December 2022.

33 Takamura, Y., 'Climate Change and Small Island Claims in the Pacific." Climate Change: International Law and Global Governance' (2013). <https://www.academia.edu/84556698/Climate_Change_and_Small_Island_Claims_in_the_Pacific> accessed 14 January 2023.

which part of damage caused is due exactly to climate change and is precisely attributable to the allegedly responsible state.

5. ADDRESSING LOSS AND DAMAGE AND DISASTER DISPLACEMENT IN VULNERABLE FIJI

We are on the precipice of monumental change in our climate. This resonates with Ord's (2020)[34] prediction/estimates that the anthropogenic risks (including risks from nuclear war, climate change, and environmental damage. Being significantly higher, these risks pose about 1 in 1,000 chance of existential catastrophe within the next 100 years[35]. However, the odds are much higher that climate change will result in non-existential catastrophes, which could in turn make us more vulnerable to other existential risks (Ord, 2020)[36]. At the recent COP27, L&D are of prime concern and important component of the negotiations under the UNFCCC. According to UNOPS (2022)[37], member States are at a pivotal moment for the definition of their commitments around the Santiago Network to coordinate and strengthen efforts to avert, minimize and address L&D in vulnerable developing countries. Discussions for the Glasgow Dialogue[38], established at COP26, to define relevant funding arrangements are also ongoing.

While the policy landscape continues to evolve, however, vulnerable countries and communities are already being affected by the adverse impacts of climate change. Everywhere around the world, L&D due to climate change translate into human mobility impacts, and with the displacement of millions of people from their homes. Urgent action is already needed to allow people to cope with current climate impacts and to prevent future ones – and human mobility considerations need to be a core part of these concerns and related operational efforts. The common challenges of displacement in the context of the impacts of climate change manifest in very diverse manners for different countries and communities. Hazards and risks, potential impacts, and related mobility outcomes are different across contexts, requiring diverse approaches to translate into practice the policy objectives of "averting, minimizing and addressing" L&D – especially as they relate to displacement and other population movements[39].

The community-based research revealed four 'pathways to loss and damage', or in other words, four situations in which actors in the case

[34] Ord, T., 'The Precipice: Existential Risk and the Future of Humanity' (Hachette, 2020).
[35] Ibid 3
[36] Ibid 4
[37] UNOPS, 'Platform on Disaster Displacement. Addressing Loss and Damage and Disaster Displacement in Vulnerable Countries. COP27 Side Event' (12 November 2022, 11:30am-12:30 pm Sharm El-Sheikh, Climate Mobility Pavilion, Blue Zone) <https://disasterdisplacement.org/cop27-side-event-addressing-loss-damage-and-disaster-displacement-in-vulnerable-countries> accessed 4 January 2023.
[38] UNFCCC, 'Glasgow Dialogue on Article 6 of the Paris Agreement and Supporting Mechanisms' (2022) <https://unfccc.int/event/glasgow-dialogue> accessed 17 March 2023.
[39] Ibid 2

study sites incurred residual impacts of climate stressors, leading to deepening poverty, erosion of household living standards and health[40]. The research showed that actors incur loss and damage when:

- existing coping/adaptation measures were not enough to avoid loss and damage
- measures had costs (economic, social, cultural, health, etc.) that were not regained
- despite short-term merits, measures had negative effects in the longer term
- no measures were adopted – or possible – at all. In the past two years, the case studies in the first special issue received over a hundred citations, underscoring the demand for more empirical data and insights on the emerging topic of loss and damage.

6. NON-ECONOMIC LOSS AND DAMAGE (NELD)

Westoby et al. (2021)[41] indicated that Pacific Islander worldviews, knowledge systems and cosmologies often make it difficult to separate and evaluate NELD independently, challenging the nomenclature of NELD categories developed through international mechanisms. Instead, NELD understandings are often centred on the interdependencies between losses, including the cascading flow-on effects that can occur and the nature of some losses as risk multipliers (i.e., one loss creating the risk for further losses).

Most notably, losses to biodiversity, ecosystem services and land are critically linked to, and have cascading effects on, livelihoods, knowledge, ways of life, wellbeing, and culture and heritage. It is argued that loss and damage are not always absolute, and that there are NELD that are arguably reparable. Concerning, however, is that the biodiversity loss, as a *risk multiplier*, was considered the least reparable by participants. Further, interconnectedness, biodiversity, and ecosystem protection and restoration are essential for gaining a thorough knowledge of NELD. Additionally, it needs to concentrate on measures to stop irreversible and cascading effects of climate change in the Pacific Islands, particularly in the very vulnerable Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Palau, Solomon Islands, Tonga, Tuvalu, and Vanuatu.

McNamara et al. (2021a)[42] conducted a systematic review to understand what was already known about non-economic loss and damage (NELD) (i.e., those irreducible to economic terms) in the Pacific

[40] van der Geest and others, 'Climate change, ecosystem services and migration in the Marshall Islands: Are they related?' (2020) 161 Climatic Change 109–127 <https://link.springer.com/article/10.1007/s10584-019-02648-7> accessed 22 April 2023.

[41] Westoby, R., and others, 'Cascading loss and loss risk multipliers amid a changing climate in the Pacific Islands' (2021) 51 (5) AMBIO A Journal of the Human Environment 1-8. <https://doi.org/10.1007/s13280-021-01640-9>.

[42] McNamara, K.E., R. Westoby, and A. Chandra, 'Exploring climate-driven non-economic loss and damage in the Pacific Islands' (2021) 50 Current Opinion in Environmental Sustainability 1–11. <https://doi.org/10.1016/j.cosust.2020.07.004>.

Islands region and concluded that: "[n]on-economic loss and damage induced by climate change in the Pacific Islands region has been reported as fears of cultural loss, deterioration of vital ecosystem services, and dislocation from ancestral lands, among others". NELD is a critical area of focus, as loss and damage research and practice have tended to prioritise identifying and addressing economic losses and damages that are easier to quantify and monetise[43]. The same authors acknowledge that there are still limited in-depth understandings of NELD and how they can be addressed, rebuilt and worked through. This can discount certain experiences and distort or skew constructions of climate change and associated decision-making[44,45,46]. The interconnected and cascading nature of loss and damage in the Pacific has emerged in other studies. Ecosystem and biodiversity losses have, for example, been observed to have inherent cascading effects on people and livelihoods[47,48,49,50,51].

Ca´mara-Leret et al. (2019)[52] also talk about the impact of climate change on 'biocultural heritage', illustrating how climate change diminishes the wellbeing and cultural integrity of Indigenous peoples by affecting endemic plant species. Damage to the relationship between people and their customary lands from climate change also has severe implications for the material, cultural and social security as well as emotional and spiritual wellbeing of Pacific Islander people[53]. In this way, NELD affects the interlinked socio-ecological system with embedded cultural, social and ecological structures, rather than affecting people and ecosystems separately. McNamara et al. (2021b)[54] argue that, in the Pacific,

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43 McNamara, K.E., and Jackson, G., 'Loss and damage: A review of the literature and directions for future research' (2019) 10 Wires Climate Change e564. <https://doi.org/10.1002/wcc.564>.

44 Magee, L., Handmer, J., Neale, T., and Ladds, M., 'Locating the intangible: Integrating a sense of place into cost estimations of natural disasters' (2016) 77 Geoforum 61–72. <https://doi.org/10.1016/j.geoforum.2016.09.018>.

45 McShane, K., 'Values and harms in loss and damage' (2017) 20 Ethics, Policy & Environment 129–142. <https://doi.org/10.1080/21550085.2017.1342960>.

46 Thomas, A.S., et al., 'Impact of Tropical Cyclone Winston on women mud crab fishers in Fiji' (2019) 11 Climate and Development 699–709. <https://doi.org/10.1080/17565529.2018.1547677>.

47 Goulding, W., Moss, P.T., and McAlpine, C.A., 'Cascading effects of cyclones on the biodiversity of Southwest Pacific Islands' (2016) 193 Biological Conservation 143–152. <https://doi.org/10.1016/j.biocon.2015.11.022>.

48 Sattler, D.N., 'Climate change and extreme weather events: the mental health impact' (2017), in W. Leal Filho (ed.), Climate Change Adaptation in Pacific Countries (Springer) 73–85.

49 Pearce, T., et al., 'Adaptation to climate change and freshwater resources in Vusama village, Viti Levu, Fiji' (2018) 18 Regional Environmental Change 501–510. <https://doi.org/10.1007/s10113-017-1222-5>.

50 Thomas, A.S., et al., 'Impact of Tropical Cyclone Winston on women mud crab fishers in Fiji' (2019) 11 Climate and Development 699–709. <https://doi.org/10.1080/17565529.2018.1547677>.

51 van der Geest and others, 'Climate change, ecosystem services and migration in the Marshall Islands: Are they related?' (2020) 161 Climatic Change 109–127 <https://link.springer.com/article/10.1007/s10584-019-02648-7> accessed April 22, 2023.

52 Ca´mara-Leret, R., et al., 'Climate change threatens New Guinea's biocultural heritage' (2019) 5 (11) Science Advances eaaz1455. <https://doi.org/10.1126/sciadv.aaz1455>.

53 Campbell, J., 'Climate Change, Migration and Land in Oceania' (2019) Toda Peace Institute, Policy Brief No. 37, Tokyo, Japan.

54 McNamara, K.E., et al., 'Understanding and responding to climate-driven non-economic loss and damage in the Pacific Islands' (2021) 33 Climate Risk Management 100336. <https://www.sciencedirect.com/science/article/pii/S2212096321000656?via%3Dihub> accessed April 22, 2023.

NELD can undermine entire socio-ecological systems, and are understood, perceived and experienced through the lens of intangible values, identity and cultural landscapes. Works by Epeli Hau'ofa[55] traversing the breadth of Oceania remind that this interconnectivity transfers to regional scales, as there is a deep connection between everything. The 'sea of islands' is a conglomeration of islands not restricted by geopolitical boundaries but connected by the sea and seafarers (Hau'ofa, 1998)[56].

7. THE PROBLEM WITHIN THE CONTEXT OF THE FIJI ISLANDS

Within the context of Fiji, what needed on the ground are more conceptual clarity and practical tools on L&D. This helps design adequate policies and practices to address loss and damage. Currently, there is no agreed-upon definition of loss and damage. In the past few years, since the rise of loss and damage in the climate change negotiations, there have been two main strands of framing loss and damage. The first strand suggests that loss and damage refer to current and/or potential manifestation of climate impacts affecting negatively human and natural systems. This type of definition does not clearly distinguish between impacts and loss and damage. By contrast, the second strand emphasises that loss and damage refer to adverse effects having not been mitigated, and that are beyond adaptation. The second strand's definition is gaining prominence among scholars and practitioners. A fit-for-purpose definition could be that "loss and damage refer to adverse effects of climate-related stressors that have not been or cannot be avoided through mitigation and adaptation efforts"[57]. Loss and damage are expected to occur in all countries, but vulnerable populations in vulnerable countries will be hit particularly hard[58].

8. PLATFORM FOR DISASTER DISPLACEMENT (PDD)

As reiterated by Brandam (2022)[59], the Platform on Disaster Displacement (PDD) organized an official side event in COP27 at the 2022 Global Platform for Disaster Risk Reduction entitled "Addressing Loss and Damage, Supporting the Most Vulnerable: Lessons from DRR and Climate Change Action." It was designed with a view to bridging important discussions held at the 2019 Global Platform for Disaster Displacement, the 26th UN Climate Change Conference of the Parties (COP26) and with a

[55] Hau'ofa, E., 'We are the ocean: Selected works' (2008) (Honolulu: University of Hawaii Press). <https://www.degruyter.com/document/doi/10.1515/9780824865542/html> accessed 17 March 2023.
[56] Ibid 9
[57] Zommers and others, 'Loss and Damage: The Role of Ecosystem Services' (United Nations Environment Programme, 2016).
[58] Ibid 2
[59] Brandam, H, 'GP22 Side Event | Addressing Loss and Damage, Supporting the Most Vulnerable' (2022) <https://disasterdisplacement.org/gp22-side-event-addressing-loss-and-damage-supporting-the-most-vulnerable> accessed 14 December 2022.

view to preparing for the Sendai Midterm Review at COP27[60]. Disaster Displacement is increasingly recognized as a form of loss and damage and while realities around the world show that limits to adaptation have been reached and many vulnerable communities experience loss and damage, including displacement and planned relocation. The disaster risk reduction (DRR), climate change and humanitarian/development communities still grapple with a coherent response to the complex challenges associated with it.

9. EXTENT OF CAUSALITY AND BURDEN OF PROOF

Otto and Minnerop (2020)[61] valued the importance of setting the "high bar" for making causal assertions. This is normally set by the rigid application of legal standards to determine the cause of an occurrence, as well as the traditional emphasis on determining the required cause in a counterfactual investigation and a judicial need for certainty. This 'but for' test level has frequently been found to be overly exclusive.[62] The developing discipline of probabilistic event attribution in the context of climate change offers important information to explain previous events and predict forthcoming events connected to anthropogenic climate change[63]. The same authors explain that climate science focuses on making robust statements about the role of climate change, quantifying changes in the likelihood of extreme weather events and attributing these to greenhouse gas (GHG) emissions or even certain other emissions. For example, one study looking at the Argentina 2013-2014 heat wave found that the event was made five times more likely due to total anthropogenic emissions and attributed 37 per cent of that probabilistic increase to GHG

[60] UNDRR, 'Midterm Review of the Sendai Framework' (2022) <https://sendaiframework-mtr.undrr.org/> accessed April 22, 2023.

[61] Otto, F and Minnerop, P, 'Climate Change and Causation Joining Law and Climate Science on the basis of Formal Logic' (2020) <https://digitalcommons.law.buffalo.edu/belj/vol27/iss1/2/ > accessed 19 December 2022.

[62] Fairchild v Glenhaven Funeral Services [2002] HL 22 [40], Lord Nicholls of Birkenhead stated 'On occasions the threshold 'but for' test of causal connection may be over-exclusionary. Where justice so requires, the threshold itself may be lowered. In this way the scope of a defendant's liability may be extended.'; see also March v Stramare (E & MH) Pty Ltd [1991] HCA 12 (Lliuya v RWE AG, 2 O 285/15, 15 December 2016) where Judge Dean argued that there are 'convincing reasons precluding its adoption as a comprehensive definitive test of causation in the law of negligence' [Grundsatz der freien Beweiswürdigung (principle of independent judicial evaluation of evidence), see Heinz Thomas and Hans Putzo, Zivilprozeßordnung (25th edn CH Beck 2003) before § 286 para 2; German Federal Court (BGH) 52 245, 256, Neue Juristische Wochenschrift 2000, 953].

[63] The author understands that climate change as defined in Article 1(2) of the Framework Convention on Climate Change (UNFCCC): 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.' The Intergovernmental Panel on Climate Change (IPCC) (the United Nations body for assessing the science related to climate change) refers in a broader sense to climate change as 'a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.', IPCC 2018: Annex I: Glossary, in Valerie Masson-Delmotte and others (eds), Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C.

emissions of the European Union[64]. The prevailing legal system for causal analysis within the context of Fiji Islands is rather unique; however, the fundamental principle of any causal explanation in law is that mere correlation between components can be differentiated from processes that cause one thing to generate another, even though laws vary from jurisdiction to jurisdiction[65].

Causal explanations thus differ from statistical explanations, and a cause can be defined as a factor having the potential to affect an event without assuming a deterministic or probabilistic relationship between the component and the outcome[66]. In contrast, the phrase is used more broadly to indicate that an event has been generated, and a component will be considered the "cause" of an event if it has at least statistically significantly increased the chance of the event's occurrence[67]. Based on this definition, a "concurrent cause" is "an act, occurrence, or a state of nature that initiates or permits,... in conjunction with other causes a chain of events leading to an effect."[68]

No real concrete attempt has been made in the Pacific Islands with respect to analysis of causality or burden of proof. Zommers et al. (2016)[69] reiterated the connection between L&D and ecosystem services, which states:

> *"Loss and damage refers to the adverse effects of climate-related stressors on natural and human systems that cannot be, or have not been, avoided through mitigation or managed through adaptation efforts. To date, studies of loss and damage have focused primarily on human systems and tended to overlook the mediating role of ecosystems and the services ecosystems provide to society. This results in a serious knowledge gap. Climate-induced loss and damage to human systems may result from permanent or temporary effects of climatic stressors on ecosystems and the services they provide. More information is needed. Indeed, the Paris Agreement urges Parties to enhance understanding, action and support in areas such as, "Resilience of communities, livelihoods and ecosystems"* (p.3).

There still seems to be some disconnect between L&D, ecosystem services and causal links (causality) with respect to climate litigation.

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64 Otto, F and others, 'Assigning historic responsibility for extreme weather events' (2017) 7 Nature Climate Change 757.

65 Strevens, M, 'Depth: an Account of Scientific Explanation' (2008) 6. Wesley C Salmon, 'Statistical explanation' in Robert G Colodny (ed.), The Nature and Function of Scientific Theories (University of Pittsburgh Press 1970) 173.

66 Sosa, E, 'Varieties of Causation', in Ernest Sosa and Michael Tooley (eds.), Causation (OUP 1993) 234.

67 Strevens, M, 'Depth: an Account of Scientific Explanation' (2008) 6.

68 Rothman, K.J, 'Causes' (2018) 201 American Journal of Epidemiology 587, 588. The term concurrent cause is thus used here in line with judgment in the case Certain Activities carried out by Nicaragua in the Border Area (Costa Rica v. Nicaragua) General List No. 150 [34], [41], Judgment of 2nd February 2018, where the ICJ for the first time in its history adjudicated compensation for environmental damage.

69 Zommers, Z, Harrison, PA, Berry, P, Soussan, J, and Smith, J, 'Loss and Damage: The Role of Ecosystem Services' (United Nations Environment Programme 2016).

10. FINDING THE CAUSAL LINK IN CLIMATE LITIGATION

Minnerop and Otto (2020)[70] emphasized that climate change litigation faces many obstacles, often revolving around procedural questions of standing[71] and jurisdiction[72] but also as a consequence of applying criteria of established legal concepts - such as causation - to a new challenge.[73] This is neatly illustrated in the decision of the District Court of Essen in the case Lluiya v. RWE[74]. The claimant, a Peruvian farmer living in the Andes, asserts that his home and livelihood are threatened by the risk of flooding from a glacial lake outburst. The glacial lake, Palcacocha, is damming glacial melt-water. The water is held by a natural moraine (deposit of irregular mass of debris from a glacier) and controlled by a set of basic pipes to reduce pressure. He claims from the German Energy provider, RWE AG, a pro rata financial contribution to flood protection measures in proportion to the company's GHG emissions on the basis of Art. 1004 of the German Civil Code (BGB).[75]

The calculation of the compensation is derived from the report on the quantified contribution of "carbon majors" to cumulative global GHG emissions[76]. The report states that the company contributed 0.47 per cent to

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70 Otto F and Minnerop, 'Climate Change and Causation Joining Law and Climate Science on the basis of Formal Logic' (2020) <https://digitalcommons.law.buffalo.edu/belj/vol27/iss1/2/> accessed April 22, 2023.

71 Case T-330/18, Carvalho v. Parliament, 2019 E.C.R. 324, 54 (reasoning that the applicants were not individually concerned).

72 Am. Elec. Power Co. v. Conn., 564 U.S. 410 (2011); Native Vill. of Kivalina v. ExxonMobil Corp., 696 F.3d 849, 858 (9th Cir. 2012), cert. denied, 569 U.S. 1000 (2013); Comer v. Murphy Oil USA, 607 F.3d 1049 (5th Cir. 2010); Bundesverwaltungsgericht Nov. 27, 2018, A-2992/2017; Jacqueline Peel, Issues in Climate Change Litigation, 1 Climate Change L. Rev. 15, 16 (2011).

73 See Geetanjali Ganguly et al., 'If at First You Don't Succeed: Suing Corporations for Climate Change' (2018) 38 Oxford J. Legal Stud. 841; Jacqueline Peel & Jolene Lin, 'Transnational Climate Litigation: The Contribution of the Global South' (2019) 113 Am. Soc'y Int'l L. 679; Sophie Marjanac & Lindene Patton, 'Extreme Weather Event Attribution Science and Climate Change Litigation: An Essential Step in the Causal Chain?' (2018) 36 J. Energy & Nat. Resources L. 265; Jacqueline Peel et al., 'Shaping the 'Next Generation' of Climate Change Litigation in Australia' (2017) 41 Melb. U.L. Rev. 793; Jacqueline Peel & Hari M. Osofsky, 'Climate Change Litigation's Regulatory Pathways: A Comparative Analysis of the United States and Australia' (2013) 35 L. & Pol'y 150; Jolene Lin, 'Climate Change and the Courts' (2012) 32 Legal Stud. 35; Brian J. Preston, 'Climate Change in the Courts' (2010) 36 Monash U. L. Rev. 15.

74 Urgenda Foundation v The State of the Netherlands C/09/456689/HA ZA 13-1396 (24 June 2015) ECLI:NL:RBDHA:2015:7196. (unofficial English translation, only the Dutch text of the ruling is authoritative, ECLI:NL:RBDHA:2015: 7145) [4.90]; The State of the Netherlands v Urgenda Foundation 200.178. 245/01 (9 Oct. 2018) ECLI:NL: GHDHA:2018:2610 (unofficial English translation).

75 The provision does not require that the property is located in Germany. Further, even a party that acts lawfully may be held liable for damage caused, a legal principle that underlies Bürgerliches Gesetzbuch [BGB] [Civil Code], § 1004 but also (as noted by the Hamm court) Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnliche Vorgänge [BImSchG] [Federal Emission Control Act] § 14(a).

76 See Richard Heede, 'Tracing Anthropogenic Carbon Dioxide and Methane Emissions to Fossil Fuel and Cement Producers, 1854-2010' (2013) 122 Climatic Change 229 (presenting a ground-breaking quantitative analysis of the historic fossil fuel and cement production records of fifty leading investor-owned, thirty-one state-owned and nine nation-state producers of oil, natural gas coal, and cement, and finding He that ninety of these 'carbon major' entities are responsible for nearly two-thirds of historic carbon dioxide and methane emissions).

the global total.[77] The Essen court held that RWE would not qualify as a disturber of the claimant's property in the absence of equivalent and adequate causation.[78] Applying the strict "*condition sine qua non*" test of causation, the court was not satisfied that the contribution of RWE could be considered to be significant given the existence of multiple other pollutants, despite acknowledging that the company was a major emitter. However, "in the light of the millions and billions of emitters worldwide" the court was unable to conclude that anthropogenic climate change, and consequently the purported flood risks of the glacial lake, would not occur without RWE's emissions.

11. PROBABILISTIC EVENT ATTRIBUTION (PEA)

Within the realms of what we know about the science of climate change, a safe conjecture is that this is a relatively new area of detection and attribution: probabilistic event attribution or "PEA". This discipline has been made possible by the growing accessibility of huge ensembles of climate models. One of the major goals of this brief desktop study is to determine whether and to what extent anthropogenic climate change has changed the likelihood and severity of a specific extreme weather event to occur, despite variances in technique[79]. "In essence, a climate model is used to simulate global mean temperature with and without anthropogenic GHG emissions finding that without these emissions the observed increase (1°C today[80]) cannot be simulated. While traditional detection and attribution methods yield significant results only when trends are very strong, changes in the probabilities of extreme events are subtler and could thus not be attributed to global GHG emissions at the time of Hasselmann when climate models were extremely costly to run"[81].

Using climate modelling and statistical modelling, scientists estimate the probability of an event to occur with climate change (P1) and in a counterfactual climate of a world without anthropogenic GHG emissions (P0), thus causally linking the occurrence probability of severe weather events to external drivers of the climate system[82]. On that basis, it is then possible to quantitatively determine even the contribution of individual countries to the changing likelihood of certain extreme weather events as a

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77 See Heede, supra note 8.

78 In German civil law, equivalent causation is the first step of the test, and the theory of adequate causation functions as a normative corrective The theory of adequate causation is used to eliminate unlikely factors from the causal chain; See also Palandt, supra note 42, at § 249.

79 Mann, M.M., Lloyd, E.A and Naomi Oreskes, 'Assessing climate change impacts on extreme weather events: the case for an alternative (Bayesian) approach' (2017) 144 Philosophy of Science 131.

80 Haustein, K., Allen, M.R., Forster, P.M. and others, 'A real-time Global Warming Index' (2017) 7 Sci. Rep. 15417 <https://doi.org/10.1038/s41598-017-14828-5> accessed April 22, 2023.

81 Ibid

82 Hannart, A and others, 'Causal counterfactual theory for the attribution of weather and climate related event' (2016) 99 Bulletin of the American Meteorological Society on the use of the Bayes' theorem in science, see Pearl (n49) 14f; Perry (n 4) 320f.

result of these countries' emissions (Otto et al., 2017).[83] Results of event attribution studies are expressed in risk ratios (RR), describing the change in occurrence frequency of the event caused by anthropogenic climate change. RR=P1/P0. Risk ratios are given with confidence intervals representing sampling and methodological uncertainties (Otto et al, 2015)[84]. The causal statement, thus, entails the identification of a cause, such as increasing emissions, and represents a causal quantity in the shape of the attributable risks (Pearl, 2009)[85]. The design and framing of the attribution study is essential for the interpretation and any further use of results that it delivers.[86]

12. CONCLUSIONS

The present analysis is a synthesis of L&D's meaning, causality concepts, discussion of climate change and causation and probabilistic event attribution (PEA). This has implications within anthropogenic climate change and has changed the likelihood and severity of specific extreme weather events, despite variances in technique, as illustrated by Mann et al., 2017[87]. However, the remains as yet quantification of this estimate of probability of an event to occur with climate change and the counterfactual climate of the world without anthropogenic GH emissions, thus causally linking the occurrence probability of severe weather events to external drivers of the climate system. This is yet to be fully quantified and to some extent qualified, adding cultural and social indicators that provide a more rounded approach to PEA.

Within the Fijian context, vulnerabilities are well known to local communities. Therefore, when vulnerabilities and thresholds are known, changing risks can be calculated beforehand, and, therefore, be forecasted. The only caveat is that there needs to be clear methodological approaches on how local climate related specific events are anticipated and, thus, appropriate climate change adaptation measures designed and implemented.

NELD seems to be an approach that is been tried and tested in the Pacific, however, as McNamara and Jackson point out, there was still limited in-depth understanding of NELD. More work needs to be done with respect to social, cultural and biological interconnectivity, which concretely underlines the importance of climate change and how it diminishes well-being and cultural integrity of Indigenous people by

[83] Otto F and others, 'Assigning historic responsibility for extreme weather events' (2017) 7 Nature Climate Change 757.

[84] Otto, F.E.L., Philip, S., Kew, S., et al., 'Attributing high-impact extreme events across timescales — a case study of four different types of events' (2018) 149 Climatic Change 399–412. <https://doi.org/10.1007/s10584-018-2258-3 > accessed April 22, 2023.

[85] Pearl, J., 'Causes of Effects and Effects of Causes' (2009) 44 (1) Sociological Methods & Research 149.

[86] Friederike EL Otto and others, 'Attribution of extreme weather events in Africa: A preliminary exploration of the science and policy implications' (2015) 132 Climatic Change 531.

[87] Mann, M.M., Lloyd, E.A and Naomi Oreskes, 'Assessing climate change impacts on extreme weather events: the case for an alternative (Bayesian) approach' (2017) 144 Sociological Methods & Research 131.

affecting endemic plant species, for example. Further work needs to be done to define how NELD affects the interlinked social cultural system within embedded cultural, social, and ecological landscapes of tradition.

PDD (Platform for Disaster Displacement), as illustrated, is a form of loss and damage, however, it's limited to adaptation and as many vulnerable communities in Fiji, for example, experience loss and damage often times. This includes displacement and planned relocation or migration (fourth migration) in two other islands because there is no potable water, food or basic resources for families to survive (e.g., Kiribati's and Fiji's attempt to move or relocate families to one of the Fijian Islands). Disaster Risk Reduction (DRR) needs to be cognizant of social and cultural implications of fourth migration; yet to be inclusive to provide more coherent responses to a complex challenge.

Finally, causality and burden of proof within the legal context is much more complicated. There remains a significant knowledge gap between climate-induced loss and damage to human systems, because of climate stressors on ecosystems and services they provide. More significant research needs to be completed on causal links in climate litigation and how specific criteria can be established to strengthen legal concepts such as causation, to just compensation for cumulative global GH emissions. Therefore, much-needed local research needs to be done to address these important issues within the Fijian cultural context. These examples can be extrapolated and used as models for other SIDS (Small-Island Developing States).

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AUTHOR'S DECLARATION AND ESSENTIAL ETHICAL COMPLIANCES

Author's Contributions (in accordance with ICMJE criteria for authorship)
This article is 100% contributed by the sole author. S/he conceived and designed the research or analysis, collected the data, contributed to data analysis & interpretation, wrote the article, performed critical revision of the article/paper, edited the article, and supervised and administered the field work.

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The author(s) solemnly declare(s) that this research has not involved any human subject (body or organs) for experimentation. It was not a clinical research. The contexts of human population/participation were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or ethical obligation of Helsinki Declaration does not apply in cases of this study or written work.

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