

Climate Change, Forced Migration and International Law in a Cross-Area and Interdisciplinary Approach: A Global Environmental Legal Solution Focusing on Adaptation?

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The gravest effects of climate change may be those on human migration as millions will be displaced.¹

ABSTRACT

The law of human rights obliges states to refrain from harming their own nationals or persons within their territory. At the same time, the range of human rights becomes more and more entrenched with other global problems and rights, such as the environmental ones, including climate change, a global environmental problem par excellence. This article aims to explain that international law is not prepared to protect environmental rights and to include climate change effects which do not know any borders or frontiers, and here it is sufficient to say that the term “climate change refugee” does not exist, legally speaking. On the other hand, climate law is not ready to build a bridge between climate change and human rights, either. In this article, we explain how to build bridges between climate change and human rights and to understand the impact of climate change and some of its consequences on forced migration. The authors combine in a legal framework different areas of law, such as human rights, refugee law, forced displacement issues with legal aspects of climate change with a focus on adaptation when linked to human rights. The article also includes an interdisciplinary element of environmental natural science considering population movement as a precautionary and pro-active measure to adapt to climate change. Therefore, the article takes a global adaptive approach while searching for a legal protection framework for climate-displaced people by advocating that climate change is one of the main drivers of forced migration. The research of this article consists of individualizing the legal challenges and potentials when designing a possible legal framework that can protect climate forced displaced people. Firstly, this article will distinguish between multiple forms of climate-induced movement to identify adequate terminology. Then, it examines the relevant areas of law,

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¹ Intergovernmental Panel on Climate Change (IPCC), 1990, First Assessment Report, p. 103, para. 5.0.10.

including international refugee law, international human rights law and international environmental law, thereby ascertaining the normative gaps within the existing legal frameworks. Finally, the authors conclude by providing possible legal solutions within an adaptation approach for the effective protection of climate-displaced people.

INTRODUCTION

With climate change, we are going to face an unpredictable threat to human societies and the planet, forcing people to move from vulnerable areas in search of a better habitual residence.² The adverse effects of ‘a change in climate, which can be attributed directly or indirectly to human activities’ will constitute a change of the physical environment.³ For decades, coping with these impacts only meant trying to mitigate them. In this regard, the most recent international achievement is the Paris Agreement,⁴ which was sealed on the 12th December 2015 and included a long-term goal of the parties to keep the temperature increase below 2 degrees above the pre-industrial level. However, it is equally important to finding ways to adapt to a changing environment. Adjusting to the adverse effects of climate change shall reduce harm and vulnerability of those people who are exposed to them.⁵ In some cases, this might be the only adequate response, because some impacts cannot be mitigated anymore. Many people, especially in developing countries, will not be able to stay in their original homes because their lives and well-being will be endangered by floods, droughts, or desertification. Therefore, adaptation to climate change shall also include migration.

When people move, they become more vulnerable. Especially climate displaced people, who have no defined legal status yet and therefore lack specific legal protection under international law,⁶ are likely to face human rights violations when fleeing from adverse effects of climate change. Furthermore, the diverse nature of the movement pattern makes it difficult to predict how many people will move and where they will move,⁷ since there is no certainty of what exactly will

² Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the ‘Adaptation Approach,’* Pace Environmental Law Review, Vol. 33, 2016, pp. 105-156, p. 105.

³ United Nations Framework Convention on Climate Change, 1994, Art. 1(2).

⁴ The Paris Agreement adopted on 12 December 2015 FCCC/CP/2015/L.9/Rev 1, United Nations Framework Convention on Climate Change (UNFCCC).

⁵ Intergovernmental Panel on Climate Change (IPCC), Climate Change Report, 2007, p. 6.

⁶ See Kälin, W., Schrepfer, N., *Protecting People Crossing Borders in the Context of Climate Change Normative Gaps and Possible Approaches* UNHCR Legal and Protection Policy Research Series, 2012, pp. 2, 28.

⁷ Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the ‘Adaptation Approach,’* Pace Environmental Law Review, Vol. 33, 2016, pp. 105-156, p. 106

cause their movement. Moreover, regarding climate change related events, it is hard to predict their frequency and scope due to a lack of knowledge, as there is a high level of unpredictability.⁸ In particular, it remains problematic to identify climate change as the only reason for people to move.⁹ In the absence of a single conceptualization, it is challenging to recognize people displaced by climate change impacts legally¹⁰ and ensure them adequate legal protection.

Nonetheless, it is important to consider population movement as a precautionary and proactive measure to adapt to climate change. Therefore, this paper will take a global adaptive approach while searching for a legal protection framework for climate-displaced people. Hence, by advocating that climate change be one of the primary drivers of forced migration, the research of this paper consists of individualizing the legal challenges and potentials when designing a possible legal framework that can protect climate-displaced people. Firstly, this article will distinguish between multiple forms of climate-induced movement to identify adequate terminology. Then, it will examine the relevant areas of law, including international refugee law, international human rights law and international environmental law, thereby ascertaining the normative gaps within the existing legal frameworks. Finally, the authors will conclude by providing possible legal solutions within an adaptation approach for the effective protection of climate-displaced people.

CONCEPTUALIZING AND DEFINING CLIMATE-DISPLACED PERSONS

There is no uniform definition for people displaced by climate change, which raises the question of which fields of law should govern this legal issue and what kind of protection shall be granted to these people.¹¹ In the following section, this paper will aim to find an adequate conceptualization of climate displaced persons by discussing already existing definitions and their limitations.

In general, migration is defined as a movement of persons, regardless of whether it is internal or cross-border, permanently or temporary, and irrespectively of causation.¹² Whereas this definition easily encapsulates any kind of movement from a habitual space, when it comes to the

⁸ Verschuuren, J., *Legal Aspects of Climate Change Adaptation in Climate Change and the Law*, Edited by Hollo, E. J., Kulovesi, K., Mehling, M., 2013, pp. 257-285, pp. 263, 264

⁹ See McAdam, J., *Climate Change, Forced Migration and International Law*, Oxford, 2012, p. 20.

¹⁰ Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the 'Adaptation Approach'*, Pace Environmental Law Review, Vol. 33, 2016, pp. 105-156, p. 106.

¹¹ Kälin, W., Schrepfer, N., *Protecting People Crossing Borders in the Context of Climate Change Normative Gaps and Possible Approaches*, UNHCR Legal and Protection Policy Research Series, 2012, p. 2.

¹² International Organisation for Immigration (2015) Key Migration Terms.

climate-related movement, it seems more difficult to find an appropriate terminology and definition.¹³

One of the first definitions of an ‘environmental refugee’ appeared in the UN Environmental Programme from 1985, where El-Hinnawi refers to ‘people who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption (natural and/or triggered by man) that jeopardized their existence and/or seriously affected the quality of their life.’¹⁴ Within this definition three different sub-categories of population movement caused by environmental stress can be recognized namely, *temporary dislocation* due to sudden-onset disasters, where there is still the possibility to return once it is safe to do so, *permanent displacement* due to drastic, long-term environmental changes and *migration of people* whether permanent or not, due to the gradual degradation of environmental conditions.¹⁵

While El-Hinnawi recognizes the varying nature of climate change impacts, which will cause different patterns of movement, he tends to ignore the multi-causal nature of population movement. Other broader definitions of environmental refugees acknowledge population pressure and poverty as additional social and economic reasons for migration rather than just climate change.¹⁶

On the other hand, the term ‘environmental refugee’ is widely criticized, since the term refugee describes a legally different situation recognized in the 1951 United Nations Convention Relating to the Status of Refugees¹⁷ and is therefore inappropriate.¹⁸ Acknowledging that this term

¹³ Kälin, W., Schrepfer, N., *Protecting People Crossing Borders in the Context of Climate Change Normative Gaps and Possible Approaches* UNHCR Legal and Protection Policy Research Series, 2012, p. 28.

¹⁴ Black, R., *Environmental refugees: myth or reality?* UNHCR New Issues in Refugee Research, Working Paper No. 34, 2001, pp.1, 2.

¹⁵ Black, R., *Environmental refugees: myth or reality?* UNHCR New Issues in Refugee Research, Working Paper No. 34, 2001, pp. 1, 2; Williams, A., ‘Turning the Tide: Recognizing Climate Change Refugees in International Law’ *Law & Policy*, Vol. 30, No. 4, 2008, pp. 502-529, p. 506.

¹⁶ See Myers, N., *Environmental Refugees: A Growing Phenomenon of the 21st Century*, *Philosophical Transactions of the Royal Society B*, Vol. 357, 2002, pp. 609-613, p. 1.

¹⁷ Convention relating to the Status of Refugees, adopted 28 July 1951 entered into force 22 April 1954, 198 UNTS 137, Art 1A(2) in conjunction with Protocol relating to the Status of Refugees adopted 31 January 1967, entered into force 4 October 1967, 606 UNTS 267, together ‘Refugee Convention’.

¹⁸ See Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the ‘Adaptation Approach,’* *Pace Environmental Law Review*, Vol. 33, 2016, pp. 105-156, p. 78; Nansen Conference, Chairman summary, para. 21.

is misleading, the UNHCR uses the term ‘environmentally displaced people’.¹⁹

A definition which pays more attention to diverse characteristics of population movement can be found in the EACH-FOR synthesis report which distinguishes between three different types of environmentally displaced persons (EDPs): ‘*environmental migrants*’ describing those who move voluntarily mainly due to reasons of environmental stress, ‘*environmental displace[e]s*’ as a group of forcedly displaced people whose life and well-being is endangered owing to harmful environmental process (natural or man-made), and ‘*development displace[e]s*’ which refers to people being relocated or resettled due to a reorganisation of land use by the authorities.²⁰ A similar conceptualization can be recognized in the Cancun Adaptation Framework by using the terms ‘migration’, ‘induced displacement’, and ‘planned relocation.’²¹

When conceptualizing the issue, one must keep in mind the diverse scenarios related to climate-induced displacement.²² A lot of movement will take place within a state itself but also across borders;²³ some migration is going to be temporary, others will move permanently; sometimes it will even be a matter of choice instead of being forced by rapid environmental stress.²⁴ Thereby, not only sudden-onset disasters will adversely affect people’s life and way of living, forcing them to move, but also slow-onset environmental degradation may compel people to at least consider moving to adapt to changing living conditions.²⁵

Thus, it can be said that no single form or pattern exists regarding climate-induced displacement.²⁶ If one also includes the different impacts of disasters with their potential to cause movement, like the frequency and intensity of a disaster, the capability of people to cope with

¹⁹ Gramilova, M., Jägers, N., *Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law*, Edited by Verschuuren, J., 2013, pp. 70-109, p. 78.

²⁰ EACH-FOR (2009) Environmental Change and Forced Migration Scenarios D.3.4. Synthesis Report, p. 8-9.

²¹ The Cancun Adaptation Framework adopted by the Parties of the UNFCCC on the 10 December 2010 as part of the Cancun Agreements at the COP16, see Article 14(f).

²² See Kälin, W., Schrepfer, N., *Protecting People Crossing Borders in the Context of Climate Change Normative Gaps and Possible Approaches*, UNHCR Legal and Protection Policy Research Series, 2012, p. 13.

²³ Ibid. p. 22.

²⁴ Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the ‘Adaptation Approach,’* Pace Environmental Law Review, Vol. 33, 2016, pp. 105-156, pp. 112, 113

²⁵ Kälin, W., Schrepfer, N., *Protecting People Crossing Borders in the Context of Climate Change Normative Gaps and Possible Approaches*, UNHCR Legal and Protection Policy Research Series, 2012, p. 14.

²⁶ Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the ‘Adaptation Approach,’* Pace Environmental Law Review, Vol. 33, 2016, pp. 105-156, p. 112.

effects, and their vulnerability, climate-induced movement seems even more unpredictable.²⁷

By acknowledging the complexity of the issue, the International Organization for Migration²⁸ (IOM) attempted to set up a definition that would include all the different scenarios. Their term ‘environmental migrants’ refers to ‘persons or groups of persons who, for reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their territory or abroad.’²⁹ It seems that this definition includes the majority of the people that will move due to climate change impacts and will be used for this paper. Regarding the terminology, the term climate-displaced persons will be used throughout this article, since it refers to climate change as a possible movement trigger.

IDENTIFYING NORMATIVE GAPS IN INTERNATIONAL LAW

When people are on the move, they face great vulnerability and are exposed to human rights violations.³⁰ Therefore, they are in need of adequate legal protection³¹. Existing legal frameworks do not provide any specific provisions naming environmental migrants, or granting them any legal status.³² However, there are various areas of law that are relevant when addressing this issue. International refugee law governs a similar issue of people on the move; international human rights law protects fundamental rights regardless of one’s legal status, and environmental law addresses the issue of climate change, and therefore all three areas of law will be examined in the following.

This article will focus only on the most significant legal instruments, while identifying and individualizing normative gaps, and pointing out the possibilities within the frameworks for a global solution integrating modeling displacement, as it will be explained further on, in section V of the present article. This modeling is embedded in this approach and treated in connection with international law to solve the problem of unpredictability that characterizes the nexus between climate change, forced displacement, and human rights.

²⁷ See Kälin, W., Schrepfer, N., *Protecting People Crossing Borders in the Context of Climate Change Normative Gaps and Possible Approaches*, UNHCR Legal and Protection Policy Research Series, 2012, p. 6.

²⁸ The IOM is a leading intergovernmental organization in the field of migration and was established in 1951.

²⁹ International Organisation for Migration, 2008, *World Migration Report*, p. 399.

³⁰ Gramilova, M., Jägers, N., *Climate Change Induced Displacement and International Law* in ‘*Research Handbook on Climate Change Adaptation Law*, Edited by Verschuuren, J., 2013, pp. 70-109, p. 80.

³¹ *Ibid.*

³² Kälin, W., Schrepfer, N., *Protecting People Crossing Borders in the Context of Climate Change Normative Gaps and Possible Approaches*, UNHCR Legal and Protection Policy Research Series, 2012, pp. 2, 28.

The concept of unpredictability in this article refers to the fact that exactly how many will flee, for example, from Nigeria, Sub-Saharan Africa, and why as well as what are the precise causes of their movement is unknown. Unpredictability, in general, which should not be confused with the concept of unpredictability³³ characterizing the phenomena of variability to climate change in adaptation, also poses problems on how to get the flow under control. This requires a global predictive solution, and it is a new area of research because it requires a new framework that deals with the different levels of acceptance from States on catastrophes. This same framework will have to raise the issue of responsibility eventually, which is to say, who can be held responsible for this human, environmental damage.

International Refugee Law

International refugee law, as *lex specialis* to international human rights law,³⁴ defines rights and protection granted to refugees. The most important legal instrument and the only one covering the fundamental rights of refugees on an international level is the Refugee Convention of 1951.³⁵ Therefore, this paper will concentrate only on these two legal instruments and will examine if they can be applied regarding climate-displaced people by discussing the requirements for refugee status.

The Refugee Convention provides protection for a person who due to a 'well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable

³³ Unpredictability when referred to adaptation to climate change means that temperature variability (and not just changes of temperature) occurring in an exponential way but are very irregular. This means that variability of temperature and oscillations related to this variability are very difficult to predict. Variability is not only oscillations or increases and decreases of temperature but also unpredictability. This aspect is crucial when government drawn adaptation plans and it also the most difficult aspect to predict and tackle when we talk about climate change. That is why modelling can help to understand and treat the problem. Regarding the unpredictability and how to incorporate this factor into legal frameworks, see Cassotta, et al, "Climate Change and Human Security in a Multi-Disciplinary Dimension: The Case of The Arctic Environmental Ocean", Springer, 2016.

³⁴ Gramilova, M., Jägers, N., Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law, Edited by Verschuuren, J., 2013, pp. 70-109, p. 89.

³⁵ Convention relating to the Status of Refugees, adopted 28 July 1951 entered into force 22 April 1954, 198 UNTS 137, Art 1A(2) in conjunction with Protocol relating to the Status of Refugees adopted 31 January 1967, entered into force 4 October 1967, 606 UNTS 267, together 'Refugee Convention'.

or, owing to such fear, is unwilling to return to it.’³⁶

Regarding the Refugee Convention, only cross-border climate-induced displacement falls within the scope of the definition since it requires the person to be outside his country of origin.³⁷ As mentioned already above, not all climate-related movement will happen cross-border; in fact, the predictions state that there will be many internally displaced people.³⁸

Therefore, the Refugee Convention is not applicable to them.³⁹ However, climate displaced people who move within their country, are recognized in the 1998 United Nations Guiding Principles on Internal Displacement, as internally displaced ‘persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border.’⁴⁰ Even though the Guiding Principles recognize natural or human-made disasters as a possible cause of movement, they are not binding, and also grant only protection when implemented in national law⁴¹.

The Refugee Convention also requires the element of persecution. This seems to be even more difficult to prove since the persecution is mostly an action related to the authorities of a state.⁴² In other words, persecution always embraces a human action, either by a state or non-state actor.⁴³ While it is less challenging to establish the link between governmental actions and discriminative prosecution, it appears to be almost impossible to prove that correlation regarding

³⁶ Refugee Convention, 1951, article 1A(2).

³⁷ Kälin, W., Schrepfer, N., *Protecting People Crossing Borders in the Context of Climate Change Normative Gaps and Possible Approaches* UNHCR Legal and Protection Policy Research Series, 2012; see also McAdam, J., *Climate Change, Forced Migration and International Law*, Oxford, 2012, p. 43.

³⁸ UN General Assembly A/67/299, Human rights of migrants, page 11.

³⁹ Gramilova, M., Jägers, N., *Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law*, Edited by Verschuuren, J., 2013, pp. 70-109, p. 83; see also McAdam, J., *Climate Change Displacement and International Law: Complementary Protection Standards* UNHCR Legal and Protection Policy Research Series, 2011, p. 12, 13.

⁴⁰ United Nations Guiding Principles on Internal Displacement, E/CN.4/1998/53/Add.2, presented to the Commission of Human Rights in 1998, hereinafter ‘Guiding Principles’, see introduction sub-paragraph 2.

⁴¹ Kälin, W., Schrepfer, N., *Protecting People Crossing Borders in the Context of Climate Change Normative Gaps and Possible Approaches* UNHCR Legal and Protection Policy Research Series, 2012, p. 23; Williams, A., ‘Turning the Tide: Recognizing Climate Change Refugees in International Law’ *Law & Policy*, Vol. 30, No. 4, 2008, pp. 502-529, p. 511.

⁴² UNHCR, 2011, *Handbook and Guidelines on Procedures and Criteria for Determining Refugee Status*, para. 65.

⁴³ Immigration and Protection Tribunal New Zealand (2013) NZIPT 800413 [25 June 2013].

climate change.⁴⁴ Even though the polluting countries could be identified as the persecutors, it seems unmanageable to relate each specific climate change impact on the conduct of states.⁴⁵ Only in rare cases, where it can be proven that certain actions or measures undertaken by the authorities could have prevented specific climate-induced disasters, can such causality can be established.⁴⁶

In cases where the Refugee Convention applies, it is usually the government who are the persecutors or the authorities are unable to provide any sufficient protection in case of persecution undertaken by non-state actors. When it comes to climate change impacts, it is rather the government who wants to protect its citizens, but fails to do so, thus forcing people to move.⁴⁷ Those people are mostly from developing countries since they are considered to be the most vulnerable to the adverse effects of climate change.⁴⁸ When they flee to escape those consequences of a changing environment, they might move to developed countries. This turns the situation into a paradox because those countries are the main polluters and can be considered as the persecutors.⁴⁹

Further on, the element of persecution includes the violation of human rights, which has to be harmful to a certain degree.⁵⁰ Such violations are likely to occur when people are on the move due to their great vulnerability. However, it depends on each case if the threshold has been met. It can be said that the effects of climate change are rarely serious enough to be considered as persecution.⁵¹

The persecution must be based on an exhaustive list of grounds, leaving no space for broadening the application.⁵² Therefore it is challenging to establish a link between the harm

⁴⁴ Gramilova, M., Jägers, N., *Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law*, Edited by Verschuuren, J., 2013, pp. 70-109, p. 84.

⁴⁵ Kälin, W., Schrepfer, N., *Protecting People Crossing Borders in the Context of Climate Change Normative Gaps and Possible Approaches* UNHCR Legal and Protection Policy Research Series, 2012, p. 31.

⁴⁶ Gramilova, M., Jägers, N., *Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law*, Edited by Verschuuren, J., 2013, pp. 70-109, p. 84

⁴⁷ McAdam, J., *Climate Change Displacement and International Law: Complementary Protection Standards* UNHCR Legal and Protection Policy Research Series, 2011, p. 12, 13.

⁴⁸ See Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the 'Adaptation Approach'*, *Pace Environmental Law Review*, Vol. 33, 2016, pp. 105-156, p. 110.

⁴⁹ McAdam, J., *Climate Change Displacement and International Law: Complementary Protection Standards* UNHCR Legal and Protection Policy Research Series, 2011, p. 13.

⁵⁰ UNHCR, 2011, *Handbook and Guidelines on Procedures and Criteria for Determining Refugee Status*, para. 51.

⁵¹ McAdam, J., *Climate Change, Forced Migration and International Law*, Oxford, 2012, p. 43.

⁵² Williams, A., *Turning the Tide: Recognizing Climate Change Refugees in International Law* *Law & Policy*, Vol. 30, No. 4, 2008, pp. 502-529, p. 108.

caused by climate change induced events and these characteristics, named in Article 1A(2) of the Refugee Convention since climate change is considered to be usually indiscriminative.⁵³ On the other hand, it might be possible to find discriminative features in the effects of climate change, since they can increase the existing discrimination that certain groups of people already face.⁵⁴ Nevertheless, recognition of this disproportional vulnerability has not been acknowledged yet, as one can see in a New Zealand refugee appeal, where the court holds that the claimant, a citizen of Tuvalu seeking asylum in New Zealand due to the rising sea level, is not entitled to refugee status since he does not face greater environmental problems nor economic difficulties than any other citizen of his island.⁵⁵ Also, the Refugee Convention does not provide any protection in case of sudden and slow-onset climate change events and cannot be applied before people actually move. In conclusion, it can be considered inadequate, since it does not address population movement preemptively and grants legal protection to climate displaced persons only in a really rare number of cases.

International Human Rights Law

International human rights law grants protection to each human being without any exception. Due to its general nature, it cannot provide specific protection for climate displaced persons. However, the Human Rights Council, United Nations inter-governmental body responsible for the promotion and protection of human rights, recognizes in its resolution 7/23 not only that climate change is a global problem, but also that it will affect the enjoyment of human rights.⁵⁶ Particularly, people from developing countries will feel the consequences of a changing environment the most, since the protection of their rights is already endangered due to a lack of means and capacity of the authorities to provide sufficient protection.⁵⁷ Thus, climate change puts them, especially the poor, in a situation where they are even more exposed to human rights violations.⁵⁸ Human rights should,

⁵³ Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the 'Adaptation Approach'*, *Pace Environmental Law Review*, Vol. 33, 2016, pp. 105-156, p. 116; Gramilova, M., Jägers, N., *Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law*, Edited by Verschuuren, J., 2013, pp. 70-109, p. 85.

⁵⁴ Scott, M., *Natural hazards, human actors, serious harm: Refugee protection through understanding the social construction of disasters* Nordic Asylum Law Seminar, 2015, p. 2, 29.

⁵⁵ See Refugee Appeal No 72186 (2000) NZRSAA 336 (10 August 2000).

⁵⁶ UN Human Rights Council Resolution 7/23, 2008.

⁵⁷ Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the 'Adaptation Approach'*, *Pace Environmental Law Review*, Vol. 33, 2016, pp. 105-156, pp. 121, 124.

⁵⁸ See UNHRC Resolution 7/23.

therefore, be the center of concern when one thinks about the protection of climate-displaced persons.⁵⁹

The International Covenant on Civil and Political Rights (ICCPR)⁶⁰ states in Article 2(1) that ‘[e]ach State [...] undertakes to respect and to ensure to all individuals within its territory and subject to its jurisdiction the rights recognized in the present Covenant [...]’.⁶¹ Therefore it establishes a positive obligation of the states to provide protection to those who are displaced internally. Furthermore, as mentioned above, those people also fall under the protection of the Guiding Principles, which have to be incorporated into national law, since they are soft law.⁶² No such protection and duty exist when it comes to cross-border movement, and it can be said that internally displaced people enjoy greater protection.⁶³

Article 2(1) of the International Covenant on Economic, Social and Cultural Rights (ICESCR) declares that the states have ‘to take steps, individually and through international assistance and co-operation, [...], to the maximum of its available resources, with a view to achieving progressively the full realization of the rights recognized in the present Covenant [...]’.⁶⁴ As it does not expressly refer to a state’s territory, it provides a legal basis for extra-territorial obligations.⁶⁵

However, this obligation is not acknowledged by all parties but is rather seen as a moral obligation.⁶⁶ Article 2(1) and other articles of the ICESCR, such as Article 11(2) and 15(4), mention the international co-operation and assistance and acknowledge its importance because

⁵⁹ See Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the ‘Adaptation Approach,’* *Pace Environmental Law Review*, Vol. 33, 2016, pp. 105-156, pp. 121, 124.

⁶⁰ General Assembly International Covenant on Civil and Political Rights (ICCPR), adopted on 16 December 1966, entered into force 23 March 1976, UNTS vol. 99.

⁶¹ ICCPR, Article 2(1).

⁶² United Nations Guiding Principles on Internal Displacement, E/CN.4/1998/53/Add.2, see introduction sub-paragraph.

⁶³ See Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the ‘Adaptation Approach,’* *Pace Environmental Law Review*, Vol. 33, 2016, pp. 105-156, p. 120.

⁶⁴ General Assembly International Covenant on Economic, Social and Cultural Rights (ICESCR), adopted on 16 December 1966, entered into force 3 January 1976, United Nations, Treaty Series, vol. 993.

⁶⁵ See Curtis, C., Sepúlveda, M., ‘*Are Extra-Territorial Obligations Reviewable under the Optional Protocol to the ICESCR?*’ *Nordic Journal of Human Rights*, Vol. 27, No. 1, 2009, pp. 54-63, p. 56.

⁶⁶ Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the ‘Adaptation Approach,’* *Pace Environmental Law Review*, Vol. 33, 2016, pp. 105-156, p. 126.

climate change and its consequences can only be dealt with internationally.⁶⁷ Since the realization of human rights within a state depends on the capacity of the authorities to provide sufficient protection of such rights, the aspect of international assistance seems even more important for developing countries, which are more likely to lack such capacity. Therefore, especially the developed countries have an extra-territorial duty to provide assistance when it comes to the protection of economic, social, and cultural rights.⁶⁸ What remains uncertain is how far the scope of this obligation reaches and in what specific form the duty has to be undertaken.⁶⁹

People fleeing cross-border have no specific right to enter and stay in a foreign country under international human rights law. In the absence of those rights, the principle of non-refoulement applies to protect people who are to be returned to a country where they will face a serious threat to life, physical integrity, and freedom. This principle can be derived from different human rights conventions, which prohibit torture or other inhuman or degrading treatment.⁷⁰ Thus, it can be considered as a complementary protection where the Refugee Convention does not apply.⁷¹ In concern of climate-induced displacement, the application of the non-refoulement principle seems doubtful, since not every climate change effect that causes people to move, creates a life-threatening situation.

In conclusion, even though human rights law provides the most universal and absolute protection and thus avoids the requirement of a causality link between a specific state action, climate change impacts and population movement it appears to be insufficient due to its lack of specialty when it comes to the protection of climate displaced people. However, human rights-based approach offers great potential when searching for a global legal solution. It enables consideration of human rights as guiding standards.⁷² Governments have a positive obligation to protect human rights and prevent any violation of such rights. This also includes a duty to

⁶⁷ See Gramilova, M., Jägers, N., Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law, Edited by Verschuuren, J., 2013, pp. 70-109, p. 96.

⁶⁸ See Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the 'Adaptation Approach,'* Pace Environmental Law Review, Vol. 33, 2016, pp. 105-156, p. 125.

⁶⁹ See Knox, J. H., Climate Change and Human Rights Law Virginia Journal of International Law, Vol. 50, No. 1, 2009, pp. 1-59, p. 54.

⁷⁰ Gramilova, M., Jägers, N., Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law, Edited by Verschuuren, J., 2013, pp. 70-109, p. 96, 97.

⁷¹ McAdam, J., Climate Change Displacement and International Law: Complementary Protection Standards UNHCR Legal and Protection Policy Research Series, 2011, p. 17; see also Nansen Conference, para. 22.

⁷² Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the 'Adaptation Approach,'* Pace Environmental Law Review, Vol. 33, 2016, pp. 105-156, p. 127.

undertake adequate measures to adapt to the effects of climate change. When it comes to adopting the right protection framework in response to climate change, the focus should always be on protection and promotion of human rights.⁷³

International Environmental Law

International environmental law primarily deals with the relationships between the states and does not expressly refer to climate displaced persons. Since it addresses climate change directly, some of its principles can be used to develop a protection framework.⁷⁴ Within this field of law, several legal instruments have been adopted, but most of the existing law is soft law. States seem to be reluctant to acknowledge their responsibilities for environmental damages and climate change. However, principles become binding when they achieve the status of international customary law.⁷⁵

With the UN Conference on the Human Environment in Stockholm 1972,⁷⁶ the participating states acknowledged for the first time the importance of environmental preservation and, therefore, the need to agree on common principles. The Stockholm Declaration establishes in Principle 21 the basis for the ‘no-harm principle,’ stating that ‘States have [...] the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or areas beyond the limits of national jurisdiction.’⁷⁷

The same principle was later reaffirmed in the 1992 Rio Declaration⁷⁸ and has gained worldwide recognition. The ‘no-harm principle’ grants states the sovereignty ‘to exploit their own resources,’ but when doing so, they have to ensure not to cause any damage across their national border.⁷⁹ Nevertheless, when it comes to climate-induced displacement, it is hard to identify the

⁷³ Human Rights and Equal Opportunity Commission, 2008, p. 12.

⁷⁴ See Docherty, B., Giannini, T., *Confronting a Rising Tide: A Proposal for a Convention on Climate Change Refugees* Harvard Environmental Law Review, Vol. 33, 2009, pp. 349-403; see Gramilova, M., Jägers, N., *Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law*, Edited by Verschuuren, J., 2013, pp. 70-109, p. 99.

⁷⁵ See Gramilova, M., Jägers, N., *Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law*, Edited by Verschuuren, J., 2013, pp. 70-109, p. 99.

⁷⁶ UN General Assembly, United Nations Conference on the Human Environment, Declaration of the United Nations Conference on the Human Environment, 15 December 1972, A/RES/2994, hereinafter ‘Stockholm Declaration’.

⁷⁷ Stockholm Declaration, 1972.

⁷⁸ UN General Assembly, United Nations Conference on Environment and Development, Rio Declaration on Environment and Development. 12 June 1992, A/CONF.151/26, hereinafter ‘Rio Declaration’, see Principle 2.

⁷⁹ Rio Declaration 1992, Principle 2.

link between states' actions, climate change damages, and population movement. Hence it is difficult to establish a responsibility of the states.⁸⁰

Another principle found in the Rio Declaration is the 'polluter pays principle.' This is established in Principle 21, which takes 'into account the approach that the polluter should, in principle, bear the cost of pollution.'⁸¹ The principle recognizes the ethical obligation of the developed countries, which cause most of the pollution, to help developing countries to bear the burden of climate change since they are going to face the most adverse consequences.⁸²

Especially because, as mentioned above, these countries lack the capacity and means to adapt, financial assistance from the polluting countries is urgently required.⁸³

Even though developed countries are reluctant to support the 'polluter pays principle.'⁸⁴, its importance has been recognized, and similar obligations can be found in the United Nations Framework Convention on Climate Change (UNFCCC).⁸⁵ Article 4(4) of the Convention mentions the special vulnerability of developing countries and the financial assistance that developed countries should provide, helping them to adapt to a changing environment.⁸⁶ A similar obligation for financial assistance is also found in Article 4(3). Although the UNFCCC expresses an unlimited liability for developed countries, it does not include any enforcement mechanism.⁸⁷ Also, it does not set any straight obligations by only referring to assistance. This makes its legal efficiency questionable.⁸⁸

Article 4(1) of the UNFCCC lays down the 'principle of common but differentiated responsibilities,' which recognizes the responsibility of all states together to protect the

⁸⁰ See Gramilova, M., Jägers, N., Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law Edited by Verschuuren, J., 2013, pp. 70-109, p. 100.

⁸¹ Rio Declaration, Principle 21.

⁸² Verschuuren, J., Legal Aspects of Climate Change Adaptation in Climate Change and the Law, Edited by Hollo, E. J., Kulovesi, K., Mehling, M., 2013, pp. 257-285, 265.

⁸³ Gramilova, M., Jägers, N., Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law Edited by Verschuuren, J., 2013, pp. 70-109, p. 102.

⁸⁴ Ibid.

⁸⁵ UN General Assembly, United Nations Framework Convention on Climate Change, adopted on 9 May 1992, entered into force on 21 March 1994, A/RES/48/189.

⁸⁶ See UNFCCC, 1994, Article 4.

⁸⁷ Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the 'Adaptation Approach'*, *Pace Environmental Law Review*, Vol. 33, 2016, pp. 105-156, pp. 132-135; Gramilova, M., Jägers, N., Climate Change Induced Displacement and International Law in Research Handbook on Climate Change Adaptation Law Edited by Verschuuren, J., 2013, pp. 70-109, p. 104.

⁸⁸ Ibid.

environment.⁸⁹ It acknowledges the different capabilities of countries to adapt and therefore gives consideration to the individual circumstances of each state. Due to their varying vulnerabilities and needs, states will have to undertake different measures to cope with the impacts of climate change.

By mentioning ‘precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects’⁹⁰ in Article 3(3), the UNFCCC takes a pro-active approach preventing any harm caused by climate change beforehand. The lack of scientific knowledge and the causation should not prevent the States from taking adaptation measures.⁹¹ By implementing and promoting adaptation along with mitigation, the UNFCCC sets the basis for considering population movement as an adaptation strategy. This approach has been implemented in the Cancun Adaptation Framework, adopted at the 2010 Climate Change Conference in Cancun (COP 16).

This agreement specifically refers to climate-induced displacement, migration, and planned relocation as a possible adaptation strategy, therefore putting population movement into a rather positive precautionary context.

Even though the Cancun Agreement recalls the obligations set forth in Articles 3 and 4 of the UNFCCC, no progress in promoting these obligations regarding the protection of climate displaced persons can be seen. Since the Paris Agreement, the most recent environmental instrument, also does not address the protection of climate displaced people directly, the problem of responsibility remains unsettled, and due to the lack of legally binding provisions, current environmental law does not provide sufficient protection for climate displaced persons.

PROPOSAL FOR A GLOBAL LEGAL SOLUTION

Migration has always been a natural way to adapt to a changing environment. Keeping that in mind, population movement due to climate change impacts should be considered a positive

⁸⁹ See Docherty, B., Giannini, T. ‘*Confronting a Rising Tide: A Proposal for a Convention on Climate Change Refugees*’ Harvard Environmental Law Review, Vol. 33, 2009, pp. 349-403, p. 386.

⁹⁰ UNFCCC, 1994, Article 3(3).

⁹¹ UNFCCC, 1994, Article 3(3); see also Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the ‘Adaptation Approach,’* Pace Environmental Law Review, Vol. 33, 2016, pp. 105-156, p. 130.

measure rather than a failure to adapt.⁹² In light of the precautionary principle, this approach is proactive and requires the States' governments to include migration in their adaptation strategy. By moving people from a place at risk, human rights violations can be prevented. Furthermore, population movement contributes to improving people's over-all situation by enhancing their capacity to adapt to a changing environment and, in the case of labor, migrations also their economic conditions.⁹³ Therefore, it is crucial to acknowledge the different types of mobility to identify and reduce the risk they contain.

Hence, while searching for a legal protection framework, it proves to be extremely important to adopt an adaptation approach, since it emphasizes migration as a proactive adaptation measure and focuses on the protection of human rights. As shown above, the existing legal frameworks do not provide adequate protection for climate displaced persons and do not address the problem of unpredictability. So far, the idea of migration as an adaptation strategy has only been incorporated in the Cancun Agreement. Consequently, it is important to incorporate into legal frameworks, possible approaches that can tackle the problem of unpredictability. In that sense, modeling displacement can be the first step to contribute to designing a regulatory, proactive approach rather than a reactive one.

When determining what should be taken into consideration while designing a legal protection framework for climate displaced persons, the Nansen Principles⁹⁴ provide some useful guidance.

They acknowledge the importance of focusing on human rights and recognize the limited capacity of some states to adapt, therefore calling for international co-operation based on the shared responsibility of the States. They point out that the Guiding Principles have already addressed the issue of internal displacement, but as mentioned above, the cross-border displacement still lacks sufficient protection under the existing legal frameworks.

⁹² See Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the 'Adaptation Approach'* Pace Environmental Law Review, Vol. 33, 2016, pp. 105-156, p. 131.

⁹³ See Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the 'Adaptation Approach'*, Pace Environmental Law Review, Vol. 33, 2016, pp. 105-156, p. 38; see also Barnett, J., Weber, M. *Accommodating Migration to Promote Adaptation to Climate Change* Policy Research Background Paper to the 2010 World Development Report, Working Paper 5270, World Bank, 2010, pp. 22-25.

⁹⁴ The Nansen Principles were adopted at the Nansen Conference on Climate Change and Displacement in the 21st Century, hosted by the Government of Norway in Oslo June 2011.

While observing the proposals that have been made so far, several significant aspects can be identified. First of all, when addressing climate-induced displacement, one should take into account the complexity of the issue, since climate change is usually not the sole reason why people move, but may only contribute to already existing socio-economic pressures.⁹⁵ As mentioned above, not only is it difficult to establish an extensive definition that would cover all patterns and forms of migration but also the lack of a causality link between migration and climate change impacts makes it questionable if distinguishing between the different drivers of movement is even appropriate.⁹⁶ Therefore it might be more desirable to address this issue from the perspective of what those who move will need.⁹⁷

Since climate change is considered to be a global problem and requires co-operation and assistance on an international level, several proposals have been made to adopt a new universal treaty on climate-induced displacement. However, this might not be the only appropriate response, since the impacts of climate change will vary throughout the world, and the vulnerability of people will depend on their capacity to adapt. Therefore, it is questionable if a universal treaty pays enough attention to specific domestic features and needs. Furthermore, States may be reluctant to negotiate a new treaty,⁹⁸ committing to even more obligations, especially since they are facing a current refugee crisis. Even if the States did manage to adopt a treaty (which will in any case take many years,)⁹⁹ it seems unlikely that all of them will ratify it, thus affording the treaty only limited legal effectiveness. Hence, it should be considered if addressing the issue on regional and national levels would be more appropriate. Nevertheless, climate change remains a global problem and requires international co-operation as well. After examining the applicable fields of law, it can be concluded that the UNFCCC provides the most appropriate umbrella framework for adequate protection, due to its diverse possibilities to address climate-induced displacement. Instead of designing a new framework, the usage of already existing tools of the UNFCCC could provide

⁹⁵ See McAdam, J., *Swimming against the Tide: Why a Climate Change Displacement Treaty is Not the Answer* International Journal of Refugee Law, Vol. 23, No. 1, 2011, pp. 2-27, p. 13.

⁹⁶ Ibid.

⁹⁷ Ibid.

⁹⁸ See McAdam, J., *Swimming against the Tide: Why a Climate Change Displacement Treaty is Not the Answer* International Journal of Refugee Law, Vol. 23, No. 1, 2011, pp. 2-27, p. 16; Williams, A., 'Turning the Tide: Recognizing Climate Change Refugees in International Law' Law & Policy, Vol. 30, No. 4, 2008, pp. 502-529, p. 518.

⁹⁹ See Biermann, F., Boas, I., *Preparing for a Warmer World: Towards a Global Governance System to Protect Climate Refugees* Global Environmental Politics, Vol. 10, No. 1, 2010, pp. 60-88, p. 76.

faster relief for this urgent issue.

In general, the UNFCCC recognizes adaptation in addition to mitigation, as the required responses to climate change. On the basis of Article 4(1)(b), the States are encouraged to develop adaptation programmes. To support and promote these programmes among least developed countries, the COP 7 guidelines for preparation of the national adaptation programmes of action (NAPAs) adopted in its Decision 28/CP.7.¹⁰⁰ The NAPAs recognize that the developing countries have urgent and immediate needs that have to be identified and addressed by the country itself and need the support and co-operation from the international community.¹⁰¹ Hereby, the countries that are most vulnerable to the effects of climate change have the possibility to include and address this issue of climate-induced displacement into those NAPAs, tailored to their individual circumstances. While some of the NAPAs recognize the issue of population movement as a coping strategy of people to a changing environment, they do not acknowledge the potential in migration as an adaptation strategy.¹⁰² Therefore, further promotion of the adaptation approach is required to take full advantage of the NAPAs regarding climate-induced displacement, since the technical and financial supporting mechanism is already established. The Cancun Agreement has also encouraged the least-development countries to create National Adaptation Plans (NAPs), which as voluntary instruments, allow a form of support to the aforementioned Article 4.

On the international level, the UNFCCC framework provides several advantages. It includes a great number of state parties, and it is based on the principle of common but differentiated responsibilities, which establishes a responsibility of developed countries towards developing countries to assist them with adjusting to the adverse effects of climate change based on equity. Furthermore, migration as an adaptation measure was already recognized and implemented by the UN Ad Hoc working group on long-term cooperative actions in the final draft treaty text for the conference in Copenhagen in 2009.¹⁰³ Here, the need to develop an international

¹⁰⁰ See UNFCCC Report of the Conference of the Parties, FCCC/CP/2001/13/Add.4, Decision 28/CP.7, p. 7.

¹⁰¹ See Gramilova, M., *Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the 'Adaptation Approach'*, Pace Environmental Law Review, Vol. 33, 2016, pp. 105-156, pp. 141, 144.

¹⁰² Sward, J., Codjoe, S., *Human Mobility and Climate Change Adaptation Policy: A Review of Migration in National Adaptation Programmes of Action (NAPAs)* Migration out of Poverty, Research Programme Consortium, Working Paper 6, 2012, p. 8.

¹⁰³ UN FCCC/AWGLCA/2009/14, 20 Nov. 2009, para. 12(c).

co-operation that addresses the needs of those who move due to climate change¹⁰⁴ was publicly acknowledged. Also, planned relocation as a proactive adaptation measure was also recognized. The conference emphasized that some of those who will be displaced might not be able to return.

This attempt could, therefore, further be developed in a protocol to the UNFCCC combined with modeling scenarios to tackle unpredictability since it highlights some crucial aspects, which should be taken into account when designing a new international framework on the protection of climate displaced persons.

Not only could a protocol draw on an already existing framework, but it could also link the climate change regime to the protection of climate-displaced persons, especially since an extension of the Refugee Convention status definition could endanger the current protection of the refugees, making it, an undesirable solution.¹⁰⁵ Moreover, the individual determination of the refugee status in the Refugee Convention is not favorable when it comes to climate displacement since climate change usually has impacts on a whole community rather than just on a particular individual.¹⁰⁶ Therefore, the protection status should rather be granted on a group basis.¹⁰⁷

Furthermore, there are already mechanisms established to ensure international assistance and funding for the least developed countries.¹⁰⁸ Thus, since the UNFCCC is based on the principle of common but differentiated responsibilities, which takes the burden of developing countries, the UNFCCC seems to be the most suitable ground in the existing legal frameworks for a new global legal solution. A new global combined solution is necessary to regulate the nexus between climate change, forced displacement, and human rights as they are all linked by unpredictability. Therefore, this global solution should combine science with international law and different areas. This scientific component is presented in this article, in the next section, through the modeling displacement approach based on Population Variability Analysis (PVA), and thus, suggesting a

¹⁰⁴ McAdam, J., *Swimming against the Tide: Why a Climate Change Displacement Treaty is Not the Answer* International Journal of Refugee Law, Vol. 23, No. 1, 2011, pp. 2-27, p. 19.

¹⁰⁵ See Williams, A., 'Turning the Tide: Recognizing Climate Change Refugees in International Law' Law & Policy, Vol. 30, No. 4, 2008, pp. 502-529, p. 509.

¹⁰⁶ See Biermann, F., Boas, I., *Preparing for a Warmer World: Towards a Global Governance System to Protect Climate Refugees* Global Environmental Politics, Vol. 10, No. 1, 2010, pp. 60-88, pp. 75, 76.

¹⁰⁷ Ibid.

¹⁰⁸ Ibid.

new path in modeling displacement as a consequence of climate change to be incorporated into regulatory frameworks.

MODELLING DISPLACEMENT WITH POPULATION VIABILITY ANALYSIS

There is a certain reluctance in the existing literature of disasters and displacement in a changing climate to recognize the role of modeling as a global predictive approach to solve the problem of the unpredictability of forced migration due to climate change.¹⁰⁹ As explained previously in this article, the reason for this skepticism stems from different factors that are difficult to separate from each other when forced displacement as a consequence of climate change occurs. For that reason, to be effective, modeling should be comprehensive of a wide range of scenarios for specific countries, regions, or hotspots, also considering the interactions between these elements.

With the reluctance in mind, it is possible for a single global predictive approach if different factors are taken into consideration when designing an interdisciplinary regulatory global framework applicable to forced displacement due to climate change.

In particular, four factors are determining the variations in human population size, the birth and death rate, and immigration (toward a country) and emigration (outside a country). Models of population dynamics, which incorporate causes of fluctuations in population size to predict probabilities of extinction, and to help identify the processes which contribute to a population's vulnerability, are used in Population Viability Analysis (PVA). PVA is used to describe both the process and the set of quantitative tools aimed at estimating the probability that a population, or collection of populations, will persist for some particular time in a particular period in a particular environment.¹¹⁰ The persistence of a population in a given area can be maintained as long as some individuals remain in the area. Therefore if all the individuals emigrate to another area, it is equivalent to saying that the population went extinct in the area where they originated from.

The probability of extinction of a human population in an area can be considered as a kind of local extinction of this population, even if the individuals have simply migrated into another area. This source-sink scenario in which local extinctions happened, due to emigration or death of

¹⁰⁹ Couldrey M. Herson, M, *Disasters and Displacement in a Changing Climate*, Forced Migration Review, Issue 49, May 2015, University of Oxford, Refugees Centre

¹¹⁰ Beissinger, et al, 2002

all the inhabitants of the area is also called a metapopulation scenario.¹¹¹

The stochastic processes impacting on human populations can be categorized into environmental variation and catastrophic events. Environmental variation is the fluctuation in the probabilities of birth, death, immigration, and emigration resulting from fluctuations in environmental variables such as, for example, weather conditions, which can vary, randomly or cyclically, over time.

The catastrophic events are analyzed separately from the more typical annual or seasonal fluctuations and can be considered as extremes of environmental variation (outliers in the distributions of environmental variation), for example; floods, hurricanes, and droughts.

These stochastic processes have a cascade of effects on the human populations; poverty rate, level of instruction, health care level, etcetera. The populations are then interacting with each other, for example, when migrants from one population are immigrating into another population and are often competing for the local resources. The competition for the available resources consequently affects both the local residents and the immigrants.

Population viability analyses that have been utilized extensively for modeling the viability of several animal populations in the population biology field could easily be employed for modeling disaster and displacement scenarios as a consequence of climate-induced changes. The advantage of the utilization of these models, for example, VORTEX 10.0.7.0 (Lacy & Pollak 2013), RAMAS/GIS and RAMAS Metapop (Akçakaya & Root 2013) are several compared to many “static models” which are utilized for the predictions of the consequences of climate-induced changes. The static models do not in practice consistently include the frequency and the severity of catastrophes in the input and do not consider the environmental variations as unpredictable but only as cyclical events, neglecting in this way the consequences that the unpredictability of climatic events (even if not extreme) can have on the human population, for example by ruining the harvest, which can have strong economic consequences. Lastly, these models are mostly predictive scenarios at large geographical scales and do not consider the complex interactions which occur at a smaller scale.

Population viability analysis can, therefore, have a bright future for the modelling of the

¹¹¹ Akçakaya, H., & Root, W. (2013). RAMAS GIS: linking spatial data with population viability analysis (version 6.0). *Applied Biomathematics, Setauket, New York*.

consequences of climate-induced changes also on a small geographical scale, in addition, this kind of analysis through a “sensitivity analysis” can quantify the consequences that the different climatic variables (in different combinations with other environmental parameters) can have on the population’s demographical parameters. This analysis can also implement different costs associated with emigration and immigration, altering in this way the probability that an individual decides to emigrate or decides to stay. The frequency and intensity of catastrophes rates can be modified in the input parameters and modify the predicted output scenario considerably as they will modify the probability of birth, death, immigration, and emigration. The capacity to model at the micro-geographical scale will allow the modeling of the metapopulation structure, which can identify complex interactions between the populations that would not be detectable when conducting modeling at the macro geographical scale. To underline the relevance of the change in frequency of the catastrophes or the unpredictability we propose a modification of the equation of Simon (2013)¹¹² who has proposed an equation for the definition of climate risk (CR)

$$CR = H \times [(I \times E)] / D[(V/C) - M]$$

Where (H); is the Hazard (V); is the vulnerability and (C); is the capacity to protect oneself (M); is the Risk Mitigation

Through Collective Action (I); intensity of the hazards (D), the duration of the hazard and (E) the extent of asset/livelihood Exposure.

We propose the above equation in the following:

$$CR = (\gamma + 1) \times H \times \{[(\varepsilon + 1) \times I \times E]\} / D[(V/C) - M]$$

Where γ (catastrophe component) and ε (environmental variation component) are two noise components stochastic processes. γ can have only two possible values (0 or 1) and the probability at which the value of 1 is dependent on the probability that a catastrophe occurs. ε which varies independently from γ is can have all the possible values in the range between 0 and 1.

Assuming that H, I, E, D, V, C, and M are maintained constant and that γ is = 0 then ε determines how much the environmental component influences the CR (making the climatic

¹¹² Simon, D., *The Environmental Determinants of Human Security in the Context of Climate Change*, in *Handbook of Climate Change and Human Security*, “ Edited by Redclift, M., Grasso, M., Edward Elgar, 2013, pp. 113-133.

condition harsher or milder). If $\gamma = 1$, then we get the catastrophe and its intensity is determined by the value that ε has at this moment.

The proposed equation is more realistic than the one proposed by Simon (1983) as it has incorporated the stochastic element. However, if we want a complete picture of the climatic scenario, we need to utilize the PVA mentioned above software. We, therefore, suggest that future studies should be conducted using a stochastic analysis approach and should collect environmental data paying special attention to the unpredictability and intensity of the climatic events catastrophes. Additional efforts should be devoted to trying to associate the emigration rate from an area and the immigration rate into an area with these components (unpredictability and intensity).

CONCLUSION

Climate change is unstoppable, and while some of its impacts will be possible to mitigate, others require adaptation to prevent adverse impacts on people's lives. Throughout history, migration has always been a measure to adapt to a changing environment. The increase in climate change events such as floods, storms, or drought will cause even more people to move. So far, climate-displaced people do not enjoy a specific legal recognition or sufficient protection under existing international law. International refugee law addresses population movement but refers to a different situation where people flee from persecution undertaken by humans or authorities, and an expansion of this area of law might endanger the adequate protection of those refugees. Instead, international human rights law may provide the right approach when designing a legal protection framework for climate displaced persons. Since such people are exposed to a great vulnerability and high risk of human rights violations, the protection of fundamental rights should be the main focus.

However, even though human rights law establishes a positive obligation of states to undertake adaptation measures, in case of cross-border climate displacement, it lacks the capacity to provide a right to stay in a hosting country. Therefore, taking a cross-area and interdisciplinary approach integrating international law (and its main areas, refugee law, human rights law, and international environmental law) with the role of science (modeling displacement) is required. International environmental law already provides an existing framework, which can be expanded.

Climate change, forced displacement, and human rights are linked by uncertainty and unpredictability because climate change is a non-linear phenomenon occurring in a multi-level

dimension with scale effects at the global, regional, and domestic levels. Hence, discourses, politics, and norms related to human rights and forced migration should be translated in a top-down process for the “common good,” as observed with the attempt of the UN to play a role in tackling climate change, forced migration, and human rights.

The UNFCCC offers several advantages: it already lays down the basis to recognize migration as an adaptation strategy, provides the possibility to address climate change induced displacement on a national level paying due regard to regional sensibilities, and is based on the principle of common but differentiated responsibilities and the promotion of international cooperation and assistance.

By following the adaptation approach, the international community could avoid a humanitarian crisis caused by an unregulated climate-induced population movement. To do so, pro-active and pre-emptive adaptation measures are urgently required to regulate this relationship between climate change, forced migration, and human rights. This relationship between climate change, forced migration, and human rights could even be more successfully tackled in a proactive rather than the reactive approach from the prism of international environmental law with a focus on adaptation to climate change rather than mitigation. The UN could do much more in that sense, by supporting a new Protocol to the UNFCCC Convention. The protocol should be able to tackle and regulate this relationship between climate change, forced displacement, and human rights. Nevertheless, apart from a new Protocol, the UN would need to be reformed at the institutional level and create new bodies and institutions able to incorporate the work of a scientist on modelling displacement with focus on the type of modelling suggested in this article and bridge the architecture and the provisions of such a new Protocol in a way to have perfect harmony between international environmental law and science.

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