

Université de Montréal

**The Research for International Response to the Loss and Damage Caused by
Climate Change**

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Abstract

Climate change is becoming more and more serious, which has triggered extensive discussion on how to deal with it. The international response are mitigation and adaptation. This thesis considers that adaptation is more important for the Loss and Damage caused by climate change. The first question addressed in the present thesis is what the definition of Loss and Damage caused by climate change is. Another principal question is how to fulfill the adaptation obligation in response to the Loss and Damage.

For the adaptation obligation, the research aims to give some suggestions: to make full use of the measures under the Warsaw International Mechanism; to improve the implementation mechanism of the Paris Agreement to ensure that the contracting parties fulfill their international obligations. The thesis also analyzes China's countermeasures, and it suggests that China should formulate appropriate emission reduction policies and foreign aid policies.

The thesis analyzes the "common but differentiated responsibility principle". The purpose is to discuss the prospect of the principle on adaptation obligations. Countries adhere to the principle and fulfill the adaptation obligations or the assistance obligations for other countries.

Keywords: climate change, loss and damage, mitigation obligations, adaptation obligations, implementation and compliance Mechanism

Résumé

Le changement climatique devient de plus en plus grave, ce qui a déclenché un débat approfondi sur la manière d'y faire face. La réponse internationale est l'atténuation et l'adaptation. Cette thèse considère que l'adaptation est plus importante pour les Pertes et Dommages causés par le changement climatique. La première question abordée dans la présente thèse est de savoir quelle est la définition des Pertes et Dommages causés par le changement climatique. Une autre question principale est de savoir comment remplir l'obligation d'adaptation en réponse aux Pertes et Dommages.

Pour l'obligation d'adaptation, la recherche vise à donner quelques suggestions: tirer pleinement parti des mesures du Mécanisme international de Varsovie; améliorer le mécanisme de mise en œuvre de l'Accord de Paris afin de garantir que les parties contractantes remplissent leurs obligations internationales. La thèse analyse également les contre-mesures de la Chine et suggère que la Chine devrait formuler des politiques appropriées de réduction des émissions et des politiques d'aide étrangère.

La thèse analyse le « principe de responsabilité commune mais différenciée ». L'objectif est de discuter de la perspective du principe sur les obligations d'adaptation. Les pays adhèrent au principe et remplissent les obligations d'adaptation ou les obligations d'assistance pour les autres pays.

Mots-clés: changement climatique, pertes et dommages, obligations d'atténuation, obligations d'adaptation, mécanisme de mise en œuvre et de conformité

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List of Abbreviations

Am J Comp L	American Journal of Comparative Law
Am J Int'l L	American Journal of International Law
Am J Legal Hist	American Journal of Legal History
Ariz L Rev	Arizona Law Review
art	article
arts	articles
Brook J Int'l L	Brooklyn Journal of International Law
Cambridge LJ	Cambridge Law Journal
Campbell L Rev	Campbell Law Review
Can	Canada
Can Bar J	Canada Bar Journal
Comp & Int'l LJS Afr	Comparative and International Law Journal of Southern Africa
ed	edition/editor
eds	editors
ER	English Reports
ERPL	European Review of Private Law
F	Federal Reporter
F (2d)	Federal Reporter (Second Series)
F (3d)	Federal Reporter (Third Series)

F Supp	Federal Supplement
GA	General Assembly
Harv Int'l LJ	Harvard International Law Journal
Harv L Rev	Harvard Law Review
ILM	International Legal Materials
IML	International Maritime Law
Int'l Law	International Lawyer
Int'l Rev L & Econ	International Review of Law & Economics
J	Justice/Judge
J Bus L	Journal of Business Law
J Legal Stud	Journal of Legal Studies
J Legis	Journal of Legislation
LS	Legal Studies
McGill LJ	McGill Law Journal
NSW	New South Wales
NSWLR	New South Wales Law Reports
NZ	New Zealand
n	footnote
OR	Official Records
para	paragraph
paras	paragraphs
Res	Resolution
UN	United Nations

UNTS	United Nations Treaty Series
US	United States/ United States Reports
USC	United States Code
Vict	Victoria
vol	volume
Yale LJ	Yale Law Journal

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Introduction

The Loss and Damage caused by climate change has been considered one of the threats to human beings and the global environment. The United Nations Framework Convention on Climate Change (*UNFCCC*)¹, in its Article 1, defines that “‘adverse effects of climate change’ means changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare.” The *Kyoto Protocol*² in Article 3 provides that “ the Parties included in Annex I shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B and in accordance with the provisions of this Article, with a view to reducing their overall emissions of such gases by at least 5 percent below 1990 levels in the commitment period 2008 to 2012.”

In 2010, the 16th Conference of the Parties to the *UNFCCC* established the Cancun Adaptation Framework with the objective of enhancing action on adaptation, including through international cooperation and coherent consideration of matters relating to adaptation under the Convention. The Cancun Agreement invites all Parties

¹ United Nations Framework Convention on Climate Change, 4 June 1992, UNTS, (entered into force 21 March 1994), online: <https://unfccc.int/resource/docs/convkp/conveng.pdf>.

² Kyoto Protocol, December 1997, UNTS, (entered into force 16 February 2005), online: <https://unfccc.int/resource/docs/convkp/kpeng.pdf>.

to enhance action on adaptation under the Cancun Adaptation Framework, taking into account their common but differentiated responsibilities and respective capabilities, and specific national and regional development priorities, objectives and circumstances.³ The Cancun Adaptation Framework reemphasized the obligation of adaptation under Article 4 (1) (b) of the *UNFCCC* and invited Parties to cooperate regarding specific actions on the national, regional, and international levels when it comes to the issue of population movement due to climate change.⁴ Under the Cancun Adaptation Framework, the “Warsaw International Mechanism on Loss and Damage” was eventually formed at the 19th Conference of the Parties to the *UNFCCC* in 2013. It decides that the Warsaw International Mechanism shall fulfil the role under the Convention of promoting the implementation of approaches to address loss and damage associated with the adverse effects of climate change.⁵ Warsaw International Mechanism has the task of dealing with Loss and Damage, coordinating the work of existing institutions, holding meetings, and preparing materials. Through international cooperation, we consider the national conditions of each country to effectively fulfill its international obligations, and strengthens its capacity for disaster prevention and reduction. The Warsaw Mechanism enhances knowledge and understanding of comprehensive risk management approaches to address loss and damage associated

³ United Nations, *Report of the Conference of the Parties on its sixteenth session*, Official Records FCCC/CP/2010/7/Add.1 (Cancun: UN, 2010) at 4, online:

<https://unfccc.int/documents?f%5B0%5D=conference%3A3399&f%5B1%5D=conference%3A3452>.

⁴ Mariya Gromilova, “Finding Opportunities to Combat the Climate Change Migration Crisis: The Potential of the ‘Adaptation Approach’” (2016) 33 *Pace Env'tl Rev* 105 at 107.

⁵ United Nations, *Report of the Conference of the Parties on its nineteenth session*, Official Records FCCC/CP/2013/10/Add.1 (Warsaw: United Nations, 2013) at 6, online:

<https://unfccc.int/documents?f%5B0%5D=conference%3A3667&f%5B1%5D=conference%3A3936&search=&page=0%2C0%2C1>.

with the adverse effects of climate change.⁶ It puts adaptation⁷ obligation in an important position and its purpose is to strengthen adaptive capacity through international cooperation. In December 2015, a binding agreement, the *Paris Agreement*⁸ was adopted at the Conference of the Parties to the *UNFCCC*. In Article 8, it provided “Parties recognize the importance of averting, minimizing and addressing Loss and Damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of Loss and Damage. The Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts shall be subject to the authority and guidance of the Conference of the Parties serving as the meeting of the Parties to this Agreement and may be enhanced and strengthened, as determined by the Conference of the Parties serving as the meeting of the Parties to this Agreement.”

As described above, international conventions or agreements mainly propose two kinds of obligations: mitigation obligations and adaptation obligations. “The mitigation measures under the climate change regime do not work well for addressing the loss and damage. Measures to reduce, or “mitigate,” greenhouse gas (GHG) emissions are, of course, of central importance. However, even if the international community were to

⁶ United Nations, *Report of the Conference of the Parties on its nineteenth session*, Official Records FCCC/CP/2013/10/Add.1 (Warsaw: United Nations, 2013) at 6, online: <https://unfccc.int/documents?f%5B0%5D=conference%3A3936&search=&page=0%2C0%2C1>.

⁷ “Adaptation is the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects”. See R K Pachauri, Leo Mayer & Intergovernmental Panel on Climate Change, *Climate change 2014: synthesis report* (Geneva, Switzerland: Intergovernmental Panel on Climate Change, 2015) at 118, online: http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml.

⁸ See Paris Agreement, 12 December 2015, UNTS, (entered into force 22 April 2016), online: https://unfccc.int/sites/default/files/english_paris_agreement.pdf.

adapt robust measures to mitigate GHG emissions, accumulated GHG emissions would nonetheless continue to warm the planet and change its climate. And the truth is that worldwide GHG emissions are increasing, not decreasing, with little sign of an imminent turnaround. Consequently, policymakers must focus not only on mitigating emissions, but also on adapting to climate change.”⁹ Countries should not be biased towards mitigation or adaptation. Legislation and policy should not be inclined to mitigation and ignore the role of adaptation. Countries should handle the relationship between mitigation and adaptation and make a good balance between them. In response to the Loss and Damage, my thesis is aiming to do some research on the fulfillment of adaptation obligation. Because the Warsaw International Mechanism was established to deal with Loss and Damage, and it mainly discussed adaptation measures, my research used the Warsaw International Mechanism as a legal tool to solve the problem of how to fulfill the obligation of adaptation. In 2017, the Conference of the Parties encourages Parties to actively engage in the work and to disseminate, promote and make use of the products of the Warsaw International Mechanism and its Executive Committee, including by: “ (c) incorporating or continuing to incorporate the consideration of extreme weather events and slow onset events, non-economic losses, climate change impacts on human mobility, including migration, displacement and planned relocation, and comprehensive risk management into relevant policy, planning and action, as appropriate, and encouraging relevant bilateral and multilateral entities to support such efforts. The Conference of the Parties reiterates its invitation to

⁹ Alice Kaswan, “Climate Change Adaptation and Land Use: Exploring the Federal Role” (2013) 47 J Marshall Rev 509 at 509, 510. See also Elisabeth Long; Eric Biber, “The Wilderness Act and Climate Change Adaptation” (2014) 44 *Envtl. L.* 623 at 623.

constituted bodies under the Convention, as appropriate, to continue to integrate into their work efforts to avert, minimize and address loss and damage associated with the adverse effects of climate change in developing countries that are particularly vulnerable to the adverse effects of climate change, vulnerable populations and the ecosystems that they depend on.”¹⁰ “It can be seen that the Warsaw International Mechanism has been emphasizing the role of risk management and migration. Risk assessments can be quantitative, where the emphasis lies on the expression of numerical results, or they can include qualitative assessments. Broader definitions of risk assessment include the analysis of risk perception, economic considerations and risk trade-off analysis. It has been held that the process of risk assessment contains three main parts: the identification of potential outcomes; the estimation of the magnitude of these outcomes; and the probability of the realization of the outcomes.”¹¹

The risk management of Warsaw International Mechanism can be improved from the process to provide the decision-makers of the Parties with tangible and accessible data upon which their decisions would be based. First, it is necessary to strengthen the action to address the gaps in the understanding of and expertise in approaches to addressing the loss and damage associated with the adverse effects of climate change. Second, it is necessary to improve the measures for collection, sharing, management and use of relevant data and information, including gender-disaggregated data. Third, it is proper to provide overviews on best practices, challenges, experiences and lessons

¹⁰ United Nations, *Report of the Conference of the Parties on its twenty-third session*, Official Records FCCC/CP/2017/11/Add.1 (Bonn: UN, 2017), online: <https://unfccc.int/node/65126>.

¹¹ Joakim Zander, *The Application of the Precautionary Principle in Practice: Comparative Dimensions* (Leiden: Cambridge University Press, 2010) at 17, 18.

acquired in undertaking the approaches to addressing such loss and damage. For small island states and the least developed countries, the loss and damage caused by climate change are permanent and irreversible. Due to permanent environmental change, people in these countries would face permanent displacement. Therefore, the formulation of effective immigration plans requires assistance from other countries through international cooperation and good faith in fulfilling their international obligations.

The Warsaw International Mechanism emphasizes the Parties' adaptation obligations but it does not provide the treatment for the non-compliance, so it is necessary to discuss the compliance mechanism. How to ensure Parties fulfill these obligations and how to deal with non-compliance by Parties are very important. "One of the most significant developments in the field of international environmental law has been the emergence of non-compliance procedures under various multilateral environmental agreements, occupying a function between conciliation and traditional dispute settlement."¹² Some scholars consider the main elements of compliance procedures and mechanisms are as follows: objective of the procedures; structure, size and composition of the committee; functions of the committee; trigger; procedural rules; transparency (openness of proceedings for non-members of the committee); consequences to be recommended or decided upon by the Compliance Committee.¹³

In 1987, Article 8 of *Montreal Protocol on Substances that Deplete the Ozone*

¹² Philippe Sands, *Principles of international environmental law*, 3rd ed. (Cambridge ; New York: Cambridge University Press, 2012) at 163.

¹³ Fitzmaurice Malgosia, Ong David & Panos Merkouris, *Research handbooks in international law* (Cheltenham, UK: Edward Elgar, 2010) at 429.

*Layer (Montreal Protocol)*¹⁴ established the first non-compliance procedure. In 1990, the Implementation Committee was established by the second Meeting of the Parties to the Protocol. By decision IV/5 adopted in 1992, the Parties agreed to establish the Implementation Committee on a permanent basis along with the Non-Compliance Procedure under which the committee operates. Article 18¹⁵ of the *Kyoto Protocol* call on the Conference of the Parties approve appropriate and effective procedures and mechanisms to determine and to address cases of non-compliance with the provisions of this Protocol.

The main function of the non-compliance mechanism of the *Montreal Protocol* is to determine the situation of non-compliance, while the *Kyoto Protocol* promotes compliance by helping to build capacity and providing financial support. The enforcement branch under the *Kyoto Protocol* can impose mandatory measures on countries who do not comply with the treaty. Article 15¹⁶ of the *Paris Agreement* provides for a new compliance mechanism which is not a compliance mechanism for inheriting the *Kyoto Protocol*. This mechanism has no mandatory compliance

¹⁴ Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol), 16 September 1987, UNTS, (entered into force on 26 January 1989), see online: https://web.archive.org/web/20130419085218/http://ozone.unep.org:80/new_site/en/Treaties/treaty_text.php?treatyID=2.

¹⁵ It provides that “the Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session, approve appropriate and effective procedures and mechanisms to determine and to address cases of non-compliance with the provisions of this Protocol, including through the development of an indicative list of consequences, taking into account the cause, type, degree and frequency of non-compliance. Any procedures and mechanisms under this Article entailing binding consequences shall be adopted by means of an amendment to this Protocol.”

¹⁶ It provides that “a mechanism to facilitate implementation of and promote compliance with the provisions of this Agreement is hereby established. The mechanism referred to in paragraph 1 of this Article shall consist of a committee that shall be expert-based and facilitative in nature and function in a manner that is transparent, non-adversarial and non-punitive. The committee shall pay particular attention to the respective national capabilities and circumstances of Parties. The committee shall operate under the modalities and procedures adopted by the Conference of the Parties serving as the meeting of the Parties to this Agreement at its first session and report annually to the Conference of the Parties serving as the meeting of the Parties to this Agreement.”

procedures, it is promotional, non-confrontational, non-punitive, and is of particular concern to the respective national capabilities of the Parties. Therefore, this compliance committee is not responsible for accountability, but a service institution of the Conference of the Parties. The provisions of the Paris Agreement on the compliance mechanism have limited its powers and have greatly weakened the coercive power of the compliance mechanism. In fact, it is impossible to punish States that do not comply with the convention by adopting a compliance mechanism. In Article 13¹⁷ of the *Paris Agreement*, it emphasizes the framework for transparency and the purpose of the framework for transparency is to fulfill the Parties' obligations of mitigation and adaptation. Article 13 and Article 14 of the *Paris Agreement* make specific arrangements for transparency, including: the national communications, biennial reports, biennial update reports, international assessment and review, international consultation and analysis, global stocktake. Maybe these arrangements make up for the shortcomings of the *Paris Agreement* without punitive measures and give the Parties great flexibility. In the future, first, the Conference of the Parties should develop standardized models for reporting, and clarify reporting procedures for Parties to monitor and review compliance by Parties. Second, the Conference of the Parties should put forward the consequences for Parties who do not comply with the conventions or agreements.

¹⁷ In Article 13 of the Paris Agreement, it provides that "the purpose of the framework for transparency of action is to provide a clear understanding of climate change action in the light of the objective of the Convention as set out in its Article 2, including clarity and tracking of progress towards achieving Parties' individual nationally determined contributions under Article 4, and Parties' adaptation actions under Article 7, including good practices, priorities, needs and gaps, to inform the global stocktake under Article 14."

In December 2018, the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change was held in Katowice. The Conference proposed “Katowice Climate Package”. The Katowice package includes guidelines that will operationalize the transparency framework. It sets out how countries will provide information about their Nationally Determined Contributions (NDCs)¹⁸ that describe their domestic climate actions. This information includes mitigation and adaptation measures as well as details of financial support for climate action in developing countries. The package also includes guidelines that relate to: the process for establishing new targets on finance from 2025 onwards to follow-on from the current target of mobilizing USD 100 billion per year from 2020 to support developing countries; how to conduct the Global Stocktake¹⁹ of the effectiveness of climate action in 2023; how to assess progress on the development and transfer of technology.²⁰ In response to transparency, implementation, and Global Stocktake, the Conference has formed a package and there are still no consequences for non-compliance.

About the methodology, in the thesis, the methods are legal positivism analysis and comparative analysis. Herbert Hart, a famous British philosopher of law and a representative of the New Analytical Jurists, believes that “law itself is a union of social

¹⁸ In 2015, 196 Parties came together under the Paris Agreement to transform their development trajectories so that they set the world on a course towards sustainable development, aiming at limiting warming to 1.5 to 2 degrees C above pre-industrial levels. Nationally determined contributions (NDCs) are at the heart of the Paris Agreement and the achievement of these long-term goals. NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change.

¹⁹ “It is a proposed five-yearly review of the impact of countries’ climate change actions. Under the Paris Agreement, every country must present a climate action plan in five-yearly cycles.” See <https://indianexpress.com/article/explained/what-is-global-stocktake/>.

²⁰ “New Era of Global Climate Action to Begin under Paris Climate Change Agreement”, online: <<https://UNFCCC.int/news/new-era-of-global-climate-action-to-begin-under-paris-climate-change-agreement-0>>.

rules: primary rules that guide behavior by imposing duties or conferring powers on people, and secondary rules that provide for the identification, alteration, and enforcement of the primary rules.”²¹ He also believes that international law is law, and international law is similar to domestic law. International law rules can also be divided into primary rules and secondary rules. The primary rules of international law are rules that stipulate international obligations that are generally observed by the subjects of international law, while the secondary rules of international law are to determine the existence of a violation of international obligations, that is, an internationally wrongful act, and to provide rules of legal consequences. According to Herbert Hart, a developed legal system should have secondary rules.

These rules establish a legal means for the recognition and enforcement of primary rules. First, they would facilitate identifying valid rules in the legal system in some authoritative ways. Second, they set out procedures for formal rules to change primary rules. Third, these rules ensure the implementation of the primary rules by establishing trial and law enforcement procedures. Herbert Hart also sought to ease the confrontation between legal positivists and natural jurists by making concessions to the theory of natural law. He believes that if any society is to survive, there must be certain rules of conduct that are possessed by the social organization, and these rules actually constitute the common factor of the laws for all societies. On the other hand, however, he firmly defended the basic principles of positivism. For example, he maintains that faithful legal obligations included all rules that were regarded as valid according to the formal

²¹ H L A Hart, *The concept of law*, 3th (Oxford: Oxford University Press, 2012) at xx.

standards of a legal system, although some of these rules may be incompatible with the common moral sense of the society.

Compared with other global environmental issues, the topic of climate change is complex and specific. On the one hand, in principle, any country and individual enjoys certain exclusive emission rights as a global public resource. On the other hand, any country and individual is inevitably affected by climate change, so it is necessary for them to take emission reduction measures and adaptation actions, especially to deal with the loss and damage caused by climate change. International conventions and agreements are thus needed to stipulate countries' obligations in emission reduction and adaptation. With the formation of the Paris Agreement, the obligations of all countries tend to be unified, showing that the international community resolutely defends its international obligations and guarantees the fulfillment of international obligations. In other words, the international community requires all countries to faithfully fulfill their international obligations. At the same time, it also takes into account the different responsibilities of countries for climate change and the differences in their capabilities to tackle it. The equity issues related to climate change are mainly the impact of global carbon emissions in human activities on global welfare as well the sharing of responsibilities among different groups and regions. In other words, when countries make responses to the loss and damage caused by climate change, adherence to the existing international obligations shall be in the first priority. However, the role of the values of fairness and justice in this process cannot be denied. Therefore, the methodology of this study will adopt the perspective of the New Analytical Jurists,

which acknowledges the positivist philosophy without discarding the natural law theory. That is to say, one of the methodologies adopted by this study, i.e., the legal positivism analysis, comes from the New Analytical Jurists.

The concept of legal obligation is central to legal practice. Statutes, case law and legal arguments are characteristically framed in terms of what some person or class of persons is obligated to do.²² About the legal positivism analysis, the concept of legal obligation is central to legal practice. Statutes, case law and legal arguments are characteristically framed in terms of what some person or class of persons is obligated to do.²³ Therefore, we study the adaptation obligations for loss and damage and we need to analyze the provisions of international conventions and agreements. My dissertation analyzes the international law for climate change from the following elements: substantive rules; procedural rules; implementation and compliance mechanism. Substantive rules: the *Paris Agreement* aims to achieve climate mitigation, adaptation and finance through a series of cooperative frameworks and mechanisms, each of which establishes different legal rights and obligations for Parties, and explicitly makes provision for the needs of developing country Parties, especially the most vulnerable.²⁴ For example, Article 7 of the *Paris Agreement* provides that Parties should strengthen their cooperation on enhancing action on adaptation, taking into account the Cancun Adaptation Framework. In the preamble of *Paris Agreement*, it

²² Espagne Association internationale de philosophie du droit et de philosophie sociale Congrès mondial Grenade, *Legal theory: legal positivism and conceptual analysis = Teoría del derecho : positivismo jurídico y análisis conceptual : proceedings of the 22nd IVR World Congress, Granada 2005 , volume I*, Archiv für Rechts- und Sozialphilosophie Beiheft Nr 106; (Stuttgart: Franz Steiner Verlag, 2007) at 13.

²³ Antonio G M La Vina, "Climate Change, Scientific Uncertainty and International Law" (1993) 68 Phil LJ 17.

²⁴ Marie Claire Cordonier Segger, "Advancing the Paris Agreement on Climate Change for Sustainable Development" (2016) 5 Camb J Intl Comp L 202 at 208.

reiterated common but differentiated responsibility principle, therefore, it means that the principle can be a guidance not only for mitigation obligations but also for the adaptation obligations. “In dealing with the loss and damage caused by climate change, this principle is conducive to narrowing the gap in adaptive capacity of small island countries, the least developed countries and other countries, and it is conducive to countries to implement adaptation actions. Procedural rules and implementation and compliance mechanism: the Parties to the *UNFCCC* negotiations have addressed the climate change problem through a new, still very weak, legal regime, which consists of two main elements: a substantive rule and a procedural rule.”²⁵ In international conventions or agreements, substantive rules and procedural rules exist simultaneously. The function of procedural rules is to ensure the realization of substantive rules. Article 18 of *Kyoto Protocol* provided procedures and mechanisms to determine and to address cases of non-compliance and the Article 15 of the *Paris Agreement* developed a new compliance mechanism. Article 13 and Article 14 of the *Paris Agreement* make a framework of transparency for the implementation and compliance of the agreement.

The comparative analysis approach involves bringing together two or more analytical objects. As in any comparative exercise, with comparative law the study of similarities and differences is the heart of the endeavor.²⁶ “The purpose of the analysis will be the most important factor in determining where one should primarily look for difference, where for similarity, and where for both in equal measure. There can obviously be no uniform structure which fits all types, but most comparative enquiries

²⁵ Alexander Zahar, "Methodological Issues in Climate Law" (2015) 5 *Climate L.* 25 at 33.

²⁶ Esin Örüçü & David Nelken, *Comparative law : a handbook* (Portland: Hart, 2007) at 25.

will involve three major stages: selection (of what will be compared), description (of the law and its context in the legal systems under consideration), and analysis.”²⁷

The objects are the Ozone Regime and the Climate Change Regime. The purpose of comparative analysis is to improve the *Paris Agreement* for addressing the Loss and Damage. The Ozone Regime and the Climate Change Regime have many unification or harmonization aspects. For example, The Ozone Regime also recognized the common but differentiated responsibility principle for developing nations. “The *Montreal Protocol* granted developing nations a ten-year delay in implementing CFC reductions, and during that time period, permitted these nations to increase CFC consumption up to 0.3 kilograms per capita. It can be seen that the ozone regime has adopted the convention-protocol model. Climate change negotiations also followed an incremental policymaking approach through use of the convention-protocol model, which inserted flexibility into the regime.”²⁸ The Ozone Regime and the Climate Change Regime have some differences. The Implementation Committee of Montreal Protocol is to determine the situation of non-compliance, while the *Kyoto Protocol* established the enforcement branch which can impose mandatory measures on countries who do not comply with the treaty. From a methodological perspective, the second method of the thesis is comparative analysis. Because the thesis is an international level study of measures to deal with the loss and damage caused by climate

²⁷ Mathias Reimann & Reinhard Zimmermann, *the Oxford handbook of comparative law* (Toronto: Oxford University Press, 2006) at 406.

²⁸ Laura Thoms, “A Comparative Analysis of International Regimes on Ozone and Climate Change with Implications for Regime Design” (2003) 41 *Colum J Transnatl L* 797 at 818.

change, and does not compare the laws of two or more countries, the comparative analysis uses a comparison of two international mechanisms.

I have searched and studied the monographs and articles of scholars and found that scholars did not define the concept of Loss and Damage caused by climate change. They focused their research on establishing an international mechanism for Loss and Damage compensation. At the same time, I analyzed the Cancun Adaptation Framework, the Warsaw International Mechanism and the Paris Agreement for the Loss and Damage. These discussions on Loss and Damage focus on how to take measures to deal with the situation. But they do not clearly indicate what is the Loss and Damage caused by climate change. So my first original view was from the interest in the concept. With regard to how countries deal with Loss and Damage, my research points out that the current view of compensation by the international community for the Loss and Damage is difficult to achieve. My research considers the relationship between mitigation obligations and adaptation obligations, and demonstrates the importance of adaptation obligations. I use the Warsaw International Mechanism as a tool to deal with Loss and Damage, and to clarify the risk management and migration proposed by the Warsaw International Mechanism. Loss and Damage caused by climate change is different from transboundary damage involving only two or more countries and it is a global problem or challenge. In order to guarantee the performance of the adaptation obligations, I explored the evolution of the non-compliance mechanism of the convention and then made recommendations on the improvement of the new compliance mechanism proposed by the *Paris Agreement*. My contribution of a

response to the Loss and Damage is to improve effectiveness of climate change law by accelerating good legislation and promoting the implementation of existing conventions.

In Part 1, the thesis talks about the climate change and the consequences of climate change at first. It aims to do some research on the definition of the loss and damage caused by climate change. In the final, it defines the loss and damage: it can be that the actual or potential adverse consequences caused by greenhouse gas emissions which will act on the life, health, property and environment. The consequences threaten the survival and sustainable development of mankind which can be avoided or unavoidable.

The Part 2 describes the legal response to the loss and damage caused by climate change. There are two ways for legal response. One is the adaptation measure, and the other is the mitigation measure. In view of the loss and damage caused by climate change, the thesis believes that the most important are adaptation measures. States should seriously fulfill their adaptation obligations, and it proposes some recommendations for the Compliance Mechanism. Therefore, special emphasis should be placed on the role of Warsaw International Mechanism, which is the guidance of international law for States to fulfill their adaptation obligations. It is also the core legal tool to deal with the loss and damage caused by climate change. In this part, the thesis also analyzes China's legal response to deal with climate change. China should avoid principled and declarative legislation in dealing with climate change. At the same time China should be clear about its emission reduction obligations and formulate more

feasible international aid policies.

In Part 3, the thesis discusses the basic principle for addressing the loss and damage: common but differentiated responsibility principle. The purpose of this thesis is to discuss the prospect of the principle on adaptation obligations. The thesis considers that some countries should help the poorest countries, respect and protect the local indigenous knowledge. Countries adhere to the principle of common but differentiated to fulfill the adaptation obligations or assistance obligations for adaptation. Common but differentiated responsibility principle is the basic principle to deal with the loss and damage caused by climate change. It is different from other principles because it is based on the theory of fairness and justice, and its concept will be given a new meaning. Different countries can fulfill their international obligations according to their own capabilities, and countries with the ability can also assist countries with difficulties in fulfilling international obligations. This kind of “differentiation” is gradually moving towards the implementation of international obligations not stay in the discussion on the historical responsibility. It can be said that it is the transformation from “static differentiation” to “dynamic differentiation”.

Part 1 The definition of the Loss and Damage caused by climate change

With the development of human industrial production, the impact of climate change has gradually intensified, and the loss and damage caused by climate change have come from adverse effects. The impact of climate change on territories, coastal ecosystems, biodiversity, population, and tourism in some countries has been translated into loss and damage that affect the survival and sustainable development of some countries. For example, as sea levels rise, Tuvalu's territory is sinking, some have been flooded, and some have been lost; a catastrophic tide in 2008 destroyed many houses, infrastructure and Food crops.²⁹ The damage to the Federated States of Micronesia is incalculable. The assessment report of the Intergovernmental Panel on Climate Change (IPCC) shows that although there is a process for the loss and damage of small island states caused by climate change, the catastrophic events that have occurred have directly proved climate change. The existence of loss and damage caused by climate change is an indisputable fact. There are divergent opinions on the nature of definitions and responsibilities, as well as response measures. And they have not yet been unified. Therefore, Part 1 discusses the definition of "loss and damage caused by climate change", "the consequences of climate change" and the provisions of international conventions and agreements on the adverse effects. In the final, it will put forward the definition of "Loss and Damage".

1.1 The emergence and evolution of the Loss and Damage

²⁹ See Michael B Gerrard & Gregory E Wannier, *Threatened island nations : legal implications of rising seas and a changing climate* (Cambridge: Cambridge University Press, 2014).

Climate change raises a range of issues, such as science, economics, justice and rights. Scientific and economic issues have been discussed on a large scale in practice by the political, economic and academic circles. Accordingly, the legal issues in climate change should also be given universal attention by the international community. In the global climate change governance, the disputes of rights and responsibilities between countries are not only a difficult problem in politics, but also a difficult problem in legal theory. We need to study more about the loss and damage caused by climate change. The essence of the research is to regulate the human behavior or national behavior that causes climate change. We also need to study the rights, obligations and responsibilities of countries from the perspective of international law. First, we start with the concept of climate change.

1.1.1 Climate change

“Climate change refers to 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. Climate change may be due to natural internal processes or external forcing such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use.”³⁰ “Greenhouse gases have been present in trace quantities in the atmosphere for the great majority of the Earth’s history. They are added into the

³⁰ The core writing team, R K Pachauri, Leo Mayer & Intergovernmental Panel on Climate Change, *Climate change 2014: synthesis report* (Geneva, Switzerland: Intergovernmental Panel on Climate Change, 2015) at 120.

atmosphere by natural processes and by human activity.”³¹ “While natural GHGs keep the Earth warm enough to be habitable, increasing their concentrations through human activity may result in raising global temperature. This is an enhanced greenhouse effect, with GHG concentrations above those produced by natural processes.”³² “Hence, it is essential to distinguish between the natural greenhouse effect and the greenhouse effect caused by human activity.”³³ Human activities, particularly the combustion of fossil fuels and the large-scale transformation of land cover, affect ecosystems around the world. Changes in temperature, ocean, cryosphere and sea level are altering our environment, these changes will also affect environmental regulatory frameworks. We note that the *UNFCCC*, in its Article 1, defines climate change as: “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 *UNFCCC* thus makes a distinction between climate change attributable to human activities altering the atmospheric composition and climate variability attributable to natural causes. Climate change stems from internal and external causes, and external causes are human activities. The thesis mainly examines climate change caused by human activities, and to regulate human activities and state behaviors from the perspective of international law to deal with Loss and Damage.

“It would seem that there is no reason for the world to hesitate before taking

³¹ Antonio G M La Vina, “Climate Change, Scientific Uncertainty and International Law” (1993) 68 *Phil LJ* 17 at 18.

³² *Ibid.*

³³ *Ibid.*

immediate action to limit or reduce GHG emissions. The problem often cited by those who would oppose a comprehensive international response to global warming is that there continues to be great uncertainty, associated with current models and data, within the scientific community. There is much debate on the extent and impact of the warming. There is also uncertainty about the global and regional distribution of climate change resulting from global warming.”³⁴ For example, in May 2001, President Bush asked the National Academy of Sciences to identify the greatest uncertainties in the science of climate change and assess “views on whether there are any substantive differences between the IPCC reports and the IPCC summaries”.³⁵ “The Bush administration has had to perform some deft leaps to maintain its solitary position on climate change. One of the more peculiar twists came during summer 2002 when the federal government, as a party to the UNFCCC, released one of its required periodic assessments. The document concluded that human activities were responsible for climate change and that the United States would suffer irrevocable environmental damage in coming decades.”³⁶ “But, the Bush administration continued to assert that climate change did not merit special action and that the Kyoto Protocol was a “fatally flawed” agreement. Instead of mitigating the effects of rising sea levels, species loss, and so forth, the White House’s advice was that the United States and other countries should adapt to the inevitable changes.”³⁷

³⁴ *Ibid* at 29.

³⁵ Lisa Schenck, “Climate Change ‘Crisis’ - Struggling for Worldwide Collective Action” (2008) 19 *Colo J Intl Env'tl Pol* 319 at 329.

³⁶ Maurie Cohen, “George W. Bush and the Environmental Protection Agency: A Midterm Appraisal” (2004) *Soc Nat Resour*, online:

<https://www.researchgate.net/publication/233078973_George_W_Bush_and_the_Environmental_Protection_Agency_A_Midterm_Appraisal>.

³⁷ *Ibid*.

“Some countries have doubted the report of IPCC, but in recent years, the position of IPCC in dealing with climate change has been paid more and more attention. The IPCC provides regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation. It was created in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programm (UNEP), and it is an organization of governments that are members of the United Nations or WMO.”³⁸ “The objective of the IPCC is to provide governments at all levels with scientific information that they can use to develop climate policies. IPCC reports are also a key input into international climate change negotiations. For the assessment reports, IPCC scientists volunteer their time to assess the thousands of scientific papers published each year to provide a comprehensive summary of what is known about the drivers of climate change, its impacts and future risks, and how adaptation and mitigation can reduce those risks. An open and transparent review by experts and governments around the world is an essential part of the IPCC process, to ensure an objective and complete assessment and to reflect a diverse range of views and expertise. Through its assessments, the IPCC identifies the strength of scientific agreement in different areas and indicates where further research is needed.”³⁹ “Through the IPCC, thousands of experts from around the world synthesize the most recent developments in climate science, adaptation, vulnerability, and mitigation every five to seven years. Governments request these reports through the intergovernmental process and the content is deliberately policy-relevant, but steers clear of any policy –

³⁸ See “IPCC - Intergovernmental Panel on Climate Change”, online: <https://archive.ipcc.ch/organization/organization_history.shtml>. Also see IPCC Secretariat, “About — IPCC”, (2013), online: IPCC <<https://www.ipcc.ch/about/>>.

³⁹ See IPCC Secretariat, “About — IPCC”, (2013), online: IPCC <<https://www.ipcc.ch/about/>>.

prescriptive statements. Government representatives work with experts to produce the “summary for policymakers” (SPM) that highlights the most critical developments in language accessible to the world’s political leaders. Scholars, academics and students can dig into the chapters and supplementary materials for a thorough and deeper understanding of the evidence.”⁴⁰

The IPCC has issued comprehensive assessments in 1990, 1996, 2001, 2007 and 2013, methodology reports, technical papers, and periodic special reports assessing specific impacts of climate change (the latest ones in the works: oceans and ice cover, land degradation, impacts of 1.5°C warming). “The fifth assessment report (AR5) is the most comprehensive synthesis to date. AR5 assessed more extensively than prior assessments the socioeconomic impacts of climate change and the challenges for sustainable development. The inclusive process by which IPCC assessments are developed and accepted by its members ensures exceptional scientific credibility.”⁴¹ During its 43rd Session (Nairobi, April 2016), the Panel accepted the invitation from the UNFCCC to produce a Special Report by 2018 on the impacts of global warming of 1.5° C above pre-industrial levels and related global greenhouse gas emission pathways, and to prepare it in the context of strengthening the global response to the threat of climate change, sustainable development and efforts to eradicate poverty.⁴² In its reports, the IPCC describes the changes in atmosphere, ocean, cryosphere, sea level

⁴⁰ “The IPCC: Who Are They and Why Do Their Climate Reports Matter?”, online: <<https://www.ucsusa.org/global-warming/science-and-impacts/science/ipcc-background.html>>.

⁴¹ *Ibid.* Also see note 38.

⁴² See *The IPCC and the Sixth Assessment cycle*, Official Records, by IPCC Secretariat, Official Records (Switzerland, 2017).

and other fields. It describes the phenomena brought about by climate change through the summary of scientific data.

Atmosphere (rising temperatures): “each of the last three decades has been successively warmer at the Earth’s surface than any preceding decade since 1850. The period from 1983 to 2012 was very likely the warmest 30-year period of the last 800 years in the Northern Hemisphere, where such assessment is possible and likely the warmest 30-year period of the last 1400 years. The globally averaged combined land and ocean surface temperature data as calculated by a linear trend show a warming of 0.85 [0.65 to 1.06] °C over the period 1880 to 2012, for which multiple independently produced datasets exist. The total increase between the average of the 1850–1900 period and the 2003–2012 period is 0.78 [0.72 to 0.85] °C, based on the single longest dataset available. For the longest period when calculation of regional trends is sufficiently complete (1901 to 2012), almost the entire globe has experienced surface warming.”⁴³ “Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate. Warming from anthropogenic emissions from the pre-industrial period to the present will persist for centuries to millennia and will continue to cause further long-term changes in the climate system, such as sea level rise, with associated impacts, but these emissions alone are unlikely to cause global warming of

⁴³ The core writing team, R K Pachauri, Leo Mayer, & Intergovernmental Panel on Climate Change, *supra* note 30 at 40. See also “UN climate report: what are the IPCC’s main messages?”, (30 September 2013), online: Clim Home News <<https://www.climatechangenews.com/2013/09/30/un-climate-report-what-are-the-ipccs-main-messages/>>.

1.5°C. Climate-related risks for natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C. These risks depend on the magnitude and rate of warming, geographic location, levels of development and vulnerability, and on the choices and implementation of adaptation and mitigation options.”⁴⁴

Ocean: “ocean warming dominates the increase in energy stored in the climate system, accounting for more than 90% of the energy accumulated between 1971 and 2010 with only about 1% stored in the atmosphere. On a global scale, the ocean warming is largest near the surface, and the upper 75 m warmed by 0.11 [0.09 to 0.13] °C per decade over the period 1971 to 2010. It is virtually certain that the upper ocean (0–700 m) warmed from 1971 to 2010, and it likely warmed between the 1870 and 1971. It is likely that the ocean warmed from 700 to 2000 m from 1957 to 2009 and from 3000 m to the bottom for the period 1992 to 2005.”⁴⁵

Cryosphere: “the cryosphere, which represents all global snow, ice, and permafrost, contains nearly 80% of all freshwater. It includes seasonal snow, mountain glaciers, ice caps, ice sheets, seasonally frozen soils, permafrost, river ice, lake ice, and sea ice. Permafrost underlines as much as 25% of the global land surface. Seasonal snow has the largest area of any component of the cryosphere; at its maximum in late winter it

⁴⁴ Intergovernmental Panel on Climate Change, *Global warming of 1.5°C* (Switzerland: Intergovernmental Panel on Climate Change, 2018) at 6, 7.

⁴⁵ The core writing team, R K Pachauri, Leo Mayer, & Intergovernmental Panel on Climate Change, *supra* note 30 at 40. See also “UN climate report: what are the IPCC’s main messages?”, (30 September 2013), online: Clim Home News <<https://www.climatechangenews.com/2013/09/30/un-climate-report-what-are-the-ipccs-main-messages/>>.

covers almost 50% of the land surface of the Northern Hemisphere. A huge proportion of the mass of the cryosphere is contained in ice sheets, but at time scales of a century or less they are least sensitive to climate change.”⁴⁶ “Many components of the cryosphere (i.e., snow, ice, and permafrost) are particularly sensitive to changes in atmospheric temperature. The last century has witnessed a massive loss and retreat of mountain glaciers, a reduction in the areal distribution of permafrost, and evidence of later freeze-up and earlier break-up of river and lake ice in many northern countries. These observations are consistent with a 0.5°C increase in the annual global mean temperature during the last century.”⁴⁷ “Over the last two decades, the Greenland and Antarctic ice sheets have been losing mass. Glaciers have continued to shrink almost worldwide. Northern Hemisphere spring snow cover has continued to decrease in extent. There is high confidence that there are strong regional differences in the trend in Antarctic sea ice extent, with a very likely increase in total extent. Glaciers have lost mass and contributed to sea level rise throughout the 20th century. The rate of ice mass loss from the Greenland ice sheet has very likely substantially increased over the period 1992 to 2011, resulting in a larger mass loss over 2002 to 2011 than over 1992 to 2011. The rate of ice mass loss from the Antarctic ice sheet, mainly from the northern Antarctic Peninsula and the Amundsen Sea sector of West Antarctica, is also likely larger over 2002 to 2011.”⁴⁸

⁴⁶ Robert T Watson, Marufu C Zinyowera & Richard H Moss, “Climate Change 1995: Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses.” (1997) 78:8 Ecology at 245.

⁴⁷ *Ibid* at 29.

⁴⁸ The core writing team, R K Pachauri, Leo Mayer, & Intergovernmental Panel on Climate Change, *supra* note 30 at 42. See also “UN climate report: what are the IPCC’s main messages?”, (30 September 2013), online: Clim Home News <<https://www.climatechangenews.com/2013/09/30/un-climate-report-what-are-the-ipccs-main-messages/>>.

Sea level: “Sea level rise under warming is inevitable. Thermal expansion would continue for many centuries after GHG concentrations have stabilized, for any of the stabilization levels assessed, causing an eventual sea level rise much larger than projected for the 21st century.”⁴⁹ “A sea-level rise of about 0.3 to 0.5 m by 2050 and about 1 m by 2100, together with a rise in temperature of the surface ocean layer of between 0.2 °C and 2.5 °C.”⁵⁰ “Over the period 1901–2010, global mean sea level rose by 0.19 [0.17 to 0.21] m. The rate of sea level rise since the mid-19th century has been larger than the mean rate during the previous two millennia. It is very likely that the mean rate of global averaged sea level rise was 1.7 [1.5 to 1.9] mm/y r between 1901 and 2010 and 3.2 [2.8 to 3.6] mm/y r between 1993 and 2010. Tide gauge and satellite altimeter data are consistent regarding the higher rate during the latter period. It is likely that similarly high rates occurred between 1920 and 1950. Since the early 1970s, glacier mass loss and ocean thermal expansion from warming together explain about 75% of the observed global mean sea level rise. Over the period 1993–2010, global mean sea level rise is, with high confidence, consistent with the sum of the observed contributions from ocean thermal expansion, due to warming, from changes in glaciers, the Greenland ice sheet, the Antarctic ice sheet and land water storage.”⁵¹ “Sea level rise is expected to exacerbate inundation, storm surge, erosion and other coastal hazards, thus

⁴⁹ The Core Writing Team, Reisinger Pachauri and Andy Reisinger & Intergovernmental Panel on Climate Change, 2007: *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, (New York: UNEP, 2007) at 19. See also “UN climate report: what are the IPCC’s main messages?”, (30 September 2013), online: Clim Home News <<https://www.climatechangenews.com/2013/09/30/un-climate-report-what-are-the-ipccs-main-messages/>>.

⁵⁰ WJ. Mc G. Tegart, G.W. Sheldon and D.C. Griffiths & Intergovernmental Panel on Climate Change, Report of Working Group II of the Intergovernmental Panel on Climate Change (Commonwealth, Australia: Intergovernmental Panel on Climate Change, 1990) at 1.

⁵¹ The core writing team, R K Pachauri, Leo Mayer, & Intergovernmental Panel on Climate Change, *supra* note 30 at 42. See also “UN climate report: what are the IPCC’s main messages?”, (30 September 2013), online: Clim Home News <<https://www.climatechangenews.com/2013/09/30/un-climate-report-what-are-the-ipccs-main-messages/>>.

threatening vital infrastructure, settlements and facilities that support the livelihood of island communities. Deterioration in coastal conditions, for example through erosion of beaches and coral bleaching, is expected to affect local resources. By mid-century, climate change is expected to reduce water resources in many small islands, e.g. in the Caribbean and Pacific, to the point where they become insufficient to meet demand during low-rainfall periods. With higher temperatures, increased invasion by non-native species is expected to occur, particularly on mid- and high-latitude islands.”⁵²

In addition to the work of the IPCC, a number of important international meetings and conferences have been held to discuss the climate change problem. The Toronto Meeting attended by more than 300 of the world’s experts in science, law, the environment, economics, government, and industry, was in June 1988. More than 300 scientists and policy makers from 46 countries, United Nations organizations, other international bodies and non-governmental organizations participated in the sessions. “Far-reaching impacts will be caused by global warming and sea-level rise, which are becoming increasingly evident as a result of continued growth in atmospheric concentrations of carbon dioxide and other greenhouse gases. Other major impacts are occurring from ozone—layer depletion resulting in increased damage from ultra-violet radiation. The best predictions available indicate potentially severe economic and social dislocation for present and future generations, which will worsen international tensions

⁵² The Core Writing Team, Reisinger Pachauri and Andy Reisinger & Intergovernmental Panel on Climate Change, 2007: *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, (New York: UNEP, 2007) at 52. See also “UN climate report: what are the IPCC’s main messages?”, (30 September 2013), online: Clim Home News <<https://www.climatechangenews.com/2013/09/30/un-climate-report-what-are-the-ipccs-main-messages/>>.

and increase risk of conflicts among and within nations. It is imperative to act now.”⁵³

Other important conference is the Noordwijk Ministerial Conference. It was held in November 1989 in Noordwijk. The Conference was attended by representatives of 67 countries, 11 international organizations, and the Commission of the European Community (EC). The Declaration includes an important statement on stabilizing emissions of carbon dioxide (CO₂): “The Conference recognizes the need to stabilize, while ensuring stable development of the world economy, CO₂ emissions and emissions of other greenhouse gases not controlled by the Montreal Protocol. Industrialized nations agree that such stabilization should be achieved by them as soon as possible, at levels to be considered by the IPCC and the Second World Climate Conference of November 1990. In the view of many industrialized nations such stabilization of CO₂ emissions should be achieved as a first step at the latest by the year 2000.”⁵⁴

The 1990 Second World Climate Conference led up to negotiation of the Framework Convention on Climate Change. It was held in Geneva, Switzerland in November 1990. The final declaration did not specify any international targets for reducing emissions. However, it did support a number of principles later included in the Climate Change Convention. These were climate change as a “common concern of humankind”, the importance of equity, the “common but differentiated responsibilities” of countries at different levels of development, sustainable development, and the

⁵³ “Statement-from-1988-climate-change-conference-in-Toronto.png”, online: <<https://254155-841844-raikfcquaxqncofqm.stackpathdns.com/wp-content/uploads/2018/07/Statement-from-1988-climate-change-conference-in-Toronto.png>>.

⁵⁴ “Climate Change Fact Sheet 218”, online: <<https://unfccc.int/resource/ccsites/senegal/fact/fs218.htm>>.

precautionary principle.⁵⁵ Whether it is the discussion of the causes of climate change or the international response measures taken by human beings, it is a powerful illustration of the existence of climate change.

1.1.2 The consequences of climate change

We can hear about some climate change events happening around us, such as the climate change impacts on the Lake Simcoe Watershed⁵⁶. “Higher air temperatures are delaying the timing of surface freezing (ice on) in the late fall or early winter, and promoting earlier thawing (ice off) in the late winter or early spring in a shorter duration of ice cover. Climate change has had a dramatic effect on the overall thermal structure of the lake between 1980 and 2012. The changing climate will affect Lake Simcoe’s water quality and quantity, aquatic and terrestrial ecosystem structure and function, the frequency of extreme weather events and could cause damage to natural areas and shorelines. These changes will influence the way communities throughout the Lake Simcoe watershed manage natural assets and the infrastructure that has been built around them.”⁵⁷

Climate change is a global issue. It has brought many negative effects to every region of the world. Examples of some adverse impacts for different regions are given

⁵⁵ “Climate Change Fact Sheet 217”, online: <https://unfccc.int/cop3/fccc/climate/fact17.htm>.

⁵⁶ It is a vibrant and diverse habitat and a precious source of water. It sweeps across 3,400 square kilometers and 20 municipal borders, from the Oak Ridges Moraine in the south to the Oro Moraine in the north, through York and Durham regions, Simcoe County and the cities of Kawartha Lakes, Barrie and Orillia.

⁵⁷ “Archived - Lake Simcoe Climate Change Adaptation Strategy | Ontario.ca”, online: <https://www.ontario.ca/page/lake-simcoe-climate-change-adaptation-strategy#section-0>.

below: In Africa, by 2020, 75 to 250 million people are expected to face increasing water stress due to climate change. By 2020, yields of rain-fed agriculture will be reduced by 50% in some countries. Agricultural production, including food supplies, is expected to be severely affected in many African countries, which will further affect food security and exacerbate malnutrition.⁵⁸ In Asia, by the 2050s, freshwater supplies in Central, South, East, and Southeast Asia, especially large river basins, are expected to decrease. Coastal areas, especially the densely populated giant deltas of South, East, and Southeast Asia, will face great risks due to increasing floods from the oceans.⁵⁹ In Australia and New Zealand, by 2020, biodiversity is expected to be severely lost in some ecologically rich areas, including the Great Barrier Reef and the Queensland tropical wetlands.⁶⁰ By 2030, water security issues are expected to worsen in southern and eastern Australia and northern and some eastern parts of New Zealand.⁶¹ In Europe, climate change will widen regional differences in European natural resources and assets, leading to increased risks of inland flash floods, more frequent coastal floods, and increased erosion (due to storms and rising sea levels). Mountain areas will face negative impacts such as glacier retreat, reduced snow cover, a shrinking winter tourism

⁵⁸ The Core Writing Team, Reisinger Pachauri and Andy Reisinger & Intergovernmental Panel on Climate Change, 2007: *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, (New York: UNEP, 2007) at 11, 12. See also OA US EPA, "International Climate Impacts", online: </climate-impacts/international-climate-impacts>.

⁵⁹ The Core Writing Team, Reisinger Pachauri and Andy Reisinger & Intergovernmental Panel on Climate Change, 2007: *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, (New York: UNEP, 2007) at 11, 12. See also "What impacts are expected in the future?", online: <<https://www.greenfacts.org/en/climate-change-ar4/l-3/5-future-projected-impacts.htm>>.

⁶⁰ The Core Writing Team, Reisinger Pachauri and Andy Reisinger & Intergovernmental Panel on Climate Change, 2007: *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, (New York: UNEP, 2007) at 11, 12. See also Bryson Bates, Zbigniew W. Kundzewicz, Shaohong Wu and Jean Palutikof, *Climate Change and Water. Technical Paper of the Intergovernmental Panel on Climate Change*, (Geneva: IPCC Secretariat, 2008) at 91, 92.

⁶¹ The Core Writing Team, Reisinger Pachauri and Andy Reisinger & Intergovernmental Panel on Climate Change, 2007: *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, (New York: UNEP, 2007) at 11, 12.

industry, and a substantial decline in species (by 2080, some regions will have a species decline of up to 60% under high emission conditions).⁶² In Latin America, by the middle of this century, rising temperatures and a corresponding decrease in soil moisture are expected to lead to the gradual replacement of tropical forests in the eastern Amazon and semi-arid vegetation by dryland vegetation. In many parts of tropical Latin America, extinction risks on the severe loss of biodiversity.⁶³ In North America, warming in the western mountains is expected to lead to reduced snow cover, increased winter flooding and reduced summer flows, increasing competition for over-allocated water resources. In the early decades of this century, mild climate change will increase the total output of rain-fed agriculture by 5% to 20%, but the differences between regions are large.⁶⁴

In Polar Regions, the predicted biophysical effects are mainly based on the reduction in the thickness and extent of glaciers, ice sheets, and sea ice, as well as changes in natural ecosystems that will affect many organisms, including migratory birds, mammals, and higher carnivores.⁶⁵ In Small Islands, rising sea levels are expected to exacerbate floods, storm surges, erosion and other coastal disasters, which will pose a huge threat to the critical infrastructure, settlements and facilities that support the livelihoods of island communities.⁶⁶

⁶² UNICEF Office of Research- Innocenti, "Child Rights at Risk: The case for joint action on climate change", online: *UNICEF-IRC* <<https://www.unicef-irc.org/article/928-child-rights-at-risk-the-case-for-joint-action-with-climate-change.html>>.

⁶³ *Ibid.*

⁶⁴ *Ibid.*

⁶⁵ *Ibid.*

⁶⁶ *Ibid.* See also United Nations, "Small Islands, Rising Seas", online: U N <<https://www.un.org/en/chronicle/article/small-islands-rising-seas>>.

We can see that the consequences of climate change occur in areas such as human health, heritages and biodiversity. In the conventions and documents of the international organizations, they either call the attention of the international community or directly address the serious consequences of climate change and call upon states to take measures to address the adverse consequences of climate change.

Constitution of the World Health Organization provides that “health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. The enjoyment of the highest attainable standard of health is one of the fundamental right of every human being without distinction of race, religion, and political belief, economic or social condition.”⁶⁷ The *UNFCCC* in Article 1⁶⁸ states the concept of “adverse effects of climate change”, including its impact on human health and welfare. The preamble of the *Paris Agreement* states that “climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity.” “The health status of millions of people is projected to be affected through, for example, increases in malnutrition; increased deaths, diseases and injury due to extreme

⁶⁷ Constitution of the World Health Organization, 22 July 1946, (entered into force on 7 April 1948), online: https://treaties.un.org/doc/Treaties/1948/04/19480407%2010-51%20PM/Ch_IX_01p.pdf.

⁶⁸ Article 1 of UNFCCC defines that “‘adverse effects of climate change’ means changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio economic systems or on human health and welfare.”

weather events; increased burden of diarrheal diseases; increased frequency of cardio-respiratory diseases due to higher concentrations of ground-level ozone in urban areas related to climate change; and the altered spatial distribution of some infectious diseases.”⁶⁹ “Global climate change will have diverse impacts on human health—some positive, most negative. Changes in the frequencies of extreme heat and cold, the frequencies of floods and droughts, and the profile of local air pollution and aeroallergens would affect population health directly. Other health impacts would result from the impacts of climate change on ecological and social systems. These impacts would include changes in infectious disease occurrence, local food production and undernutrition, and various health consequences of population displacement and economic disruption.”⁷⁰

The seventh session of the Human Rights Council in 2008 began to focus on the topic of “Human Rights and Climate Change”. It put forward “we concerned that climate change poses an immediate and far-reaching threat to people and communities around the world and has implications for the full enjoyment of human rights.”⁷¹ The sixteenth session in 2011 said “sustainable development and the protection of the environment can contribute to human well-being and the enjoyment of human rights.

⁶⁹ Susan Solomon, Dahe Qin, Martin Manning, Melinda Marquis, Kristen Averyt, Melinda Tignor, Henry LeRoy Miller and Zhenlin Chen & IPCC, *Climate change 2007: the physical science basis ; contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: UNEP, 2007) at 48.

⁷⁰ James J McCarthy Osvaldo Canziani, Neil Leary, David Dokken and Kasey White & Intergovernmental Panel on Climate Change, *Climate change 2001: impacts, adaptation, and vulnerability: contribution of Working Group II to the third assessment report of the Intergovernmental Panel on Climate Change* (Cambridge, UK ; New York: Cambridge University Press, 2001) at 42.

⁷¹ Human Rights Council, *Report of the Human Right Council on its seventh session*, Official Records A/HRC/7/78 (2008) at 65.

Environmental damage can have negative implications, both direct and indirect, for the effective enjoyment of human rights.”⁷² Resolution of the twenty-fifth session in 2014 recalls “other relevant Human Rights Council resolutions on human rights and climate change, on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes, on the human right to safe drinking water and sanitation, and on the right to food as well as relevant Commission on Human Rights resolutions on human rights and the environment as part of sustainable development.”⁷³ The resolution of the twenty-ninth session in 2015 re-emphasized that “the adverse effects of climate change had a direct or indirect impact on the enjoyment of the highest attainable standard of physical and mental health. It emphasized that the adverse effects of climate change had a range of implications, both direct and indirect, for the effective enjoyment of human rights, including, inter alia, the right to life, the right to adequate food, the right to the enjoyment of highest attainable standard of physical and mental health, the right to adequate housing, the right to self-determination, the right to safe drinking water and sanitation and the right to development.”⁷⁴

The Human Rights Council, as a subsidiary body of the United Nations General Assembly and directly accountable to all States Members of the United Nations, was established on 15 March 2006 in accordance with General Assembly resolution 60/251, replacing the United Nations Commission on Human Rights. The resolutions of the

⁷² Human Rights Council, *Report of the Human Rights Council on its sixteenth session*, Official Records A/HRC/16/2 (2011) at 25.

⁷³ Human Rights Council, *Report of the Human Rights Council on its Twenty-fifth session*, Promotion and protection of all human rights, civil, political, economic, social and cultural rights, including the right to development Official Records A/HRC/25/L.31 (2014) at 1.

⁷⁴ Human Rights Council, *Report of the Human Rights Council on its Twenty-ninth session*, Official Records A/HRC/29/L.21 (2015) at 2.

Human Rights Council repeatedly raise the issue of “climate change and human rights” and the impact of climate change on the right to health and other human rights related to the right to health. Although the resolutions are not international conventions, they emphasize the relationship between human rights and climate change, which reflects the international community’s concern about human rights under the influence of climate change. Under the human rights protection mechanism, the international conventions on human rights provide for the principles or specific provisions for the protection of human rights, such as: *Universal Declaration of Human Rights*⁷⁵, *International Covenant on Economic Social and Cultural Rights*⁷⁶, *Convention on the Elimination of all Forms of Discrimination against Women*⁷⁷, *Convention on the Rights of the Child*⁷⁸, *European Social Charter*⁷⁹, *African Charter on Human and Peoples Rights*⁸⁰. In some areas, climate change is affecting the rights of special populations, such as children’s rights. Climate change is an urgent challenge for the world’s children.⁸¹ Children are more vulnerable to the impact of climate change. In developing countries, it will become more difficult to maintain their commitment to the Convention

⁷⁵ Universal Declaration of Human Rights, 10 December 1948, online: https://www.ohchr.org/EN/UDHR/Documents/UDHR_Translations/eng.pdf.

⁷⁶ International Covenant on Economic Social and Cultural Rights, 16 December 1966, (entered into force 3 January 1976), online: <https://www.ohchr.org/Documents/ProfessionalInterest/cescr.pdf>.

⁷⁷ Convention on the Elimination of all Forms of Discrimination against Women, 18 December 1979, (entered into force on 3 September 1981), online: <https://www.un.org/womenwatch/daw/cedaw/text/econvention.htm>.

⁷⁸ Convention on the Rights of the Child, 20 November 1989, (entered into force 2 September 1990), online: <https://www.ohchr.org/Documents/ProfessionalInterest/crc.pdf>.

⁷⁹ European Social Charter, 18 October 1961, online: <https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=090000168048b059>.

⁸⁰ African Charter on Human and Peoples Rights, June 27 1981, (entered into force October 21 1986), online: <http://www.humanrights.se/wp-content/uploads/2012/01/African-Charter-on-Human-and-Peoples-Rights.pdf>.

⁸¹ UNICEF, “Child Rights at Risk: The case for joint action on climate change”, online: *UNICEF-IRC* <<https://www.unicef-irc.org/article/928-child-rights-at-risk-the-case-for-joint-action-with-climate-change.html>>.

on the Rights of the Child. Although all children's rights may be affected, 15 rights⁸² are particularly threatened by setbacks related to climate change.

The Paris Agreement is the first international environmental law treaty to be incorporated into the perspective of human rights law. The contents concerning human rights law are mainly reflected in the preamble. The agreement calls on all countries to pay attention to the protection of human rights such as "the right to health", "the rights of indigenous people" and "the right to development". When the constitution of the World Health Organization was formed, the international community did not pay attention to the impact of climate change on human health. With the increasing severity of climate change, the report of the Human Rights Council proposes to pay attention to the human rights under the impact of climate change. These documents show that the international community has gradually reached a consensus on the adverse impact of climate change on human rights, and the international community has begun to consider how to deal with the problem in the field.

International human rights institutions are actively calling on the international community to pay full attention to and protect human rights, so that the global response to climate change reflects all-round respect for human rights. Climate change has brought a crisis to human rights. However, from a legal point of view, climate change is not necessarily regarded as a violation of human rights law. Under the framework of international human rights law, the infringement of human rights law usually refers to

⁸² See *Ibid.*

the violation of a certain human rights obligation by a certain obligator. Therefore, not all negative effects on human rights can be regarded as human rights violations. For example, extreme weather events caused casualties, which infringed the right to life of these people. However, such violations are not caused by a country's violation of its specific human rights obligations, so it can't be regarded as a violation of human rights in the context of traditional international human rights law. Although climate change has brought "crisis" to human rights, climate change does not bring legal "infringement" to human rights. Climate change has brought about serious consequences for human survival and health, but it has not been recognized in international human rights law. The failure to establish an independent protection system in international human rights law does not mean that countries have not raised concerns about the consequences.

In the Article 2 of *Convention On Biological Diversity*⁸³, it provides that "biological diversity" means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems. 'Biological resources' includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity. 'Biotechnology' means any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use." The loss of biodiversity is the loss of the use value of biological species and ecosystems within the framework of

⁸³ Convention on Biological Diversity, 5 June 1992, 8 UNTS 214, (entered into force 29 December 1993), online: <https://www.cbd.int/doc/legal/cbd-en.pdf>.

economics, ecology and aesthetics.⁸⁴ The *Convention on Biological Diversity* is a legally binding convention aimed at protecting endangered plants and animals and maximizing the protection of the biodiversity. It covers all ecosystems, species and genetic resources, while connecting traditional conservation efforts with the economic goal of sustainable use of biological resources, and establishes the principle of fair and reasonable sharing of genetic resources.

Climate change as a threat to biodiversity is, however, nowhere mentioned in the *Convention on Biological Diversity*. It does not provide the negative consequences of climate change on biodiversity, but it does specify the concept of “loss of biodiversity”. The loss of biodiversity does exist in some countries and regions. Due to projected climate change by the mid-21st century and beyond, global marine species redistribution and marine biodiversity reduction in sensitive regions will challenge the sustained provision of fisheries productivity and other ecosystem services.⁸⁵ The impact of climate change on biodiversity and the important role of biodiversity in mitigating climate change make UNFCCC and Convention on Biological Diversity become two parallel and closely related international environmental conventions. “For the UNFCCC, focal issues related to biodiversity are as follows: LULUCF (Land Use, Land-Use Change and Forestry); REDD (Reducing Emissions from Deforestation and Forest Degradation). For the Biodiversity Convention, the major issues related to climate change are: Synergy; REDD; and related issues. The interlinkages between

⁸⁴ See Lakshman D Guruswamy, *International environmental law in a nutshell*, fourth edition, West nutshell series (StPaul, MN: West, a Thomson Reuters business, 2012) at 149.

⁸⁵ The core writing team, R K Pachauri, Leo Mayer & Intergovernmental Panel on Climate Change, *Climate change 2014: synthesis report* (Geneva, Switzerland: Intergovernmental Panel on Climate Change, 2015) at 13.

biodiversity and climate change have been recognized within both *UNFCCC* and the *Convention on Biological Diversity* as well as other international fora. Article 2 of the *UNFCCC*, for example, recognizes the importance of limiting climate change to a level that would allow ecosystems to adapt naturally to climate change. The *Convention on Biological Diversity* has adopted a number of decisions on biodiversity and climate change, and in 2001 formed an Ad Hoc Technical Expert Group (AHTEG) on Biodiversity and Climate Change, to consider the possible negative impacts of climate change related activities on biodiversity, identify the role of biodiversity in climate change mitigation and identify opportunities for achieving climate change and biodiversity co-benefits.”⁸⁶ The global community urgently calls for further research and action to reduce the impact of climate change on biodiversity and to increase synergies between biodiversity conservation and climate change mitigation and adaptation activities.

Biodiversity is under unprecedented pressure in the context of climate change. Climate change as a global problem, its impact on the ecosystem is gradually reflected. Although at the beginning of the formation of the Convention on Biological Diversity, it did not specifically mention the loss of biodiversity caused by climate change, but in recent years, studies have found that the impact of climate change on biodiversity is becoming more and more serious. Climate change, biodiversity protection and sustainable development of human beings should be considered comprehensively. The loss of biodiversity has been the adverse consequence of climate change and can't be

⁸⁶ Secretariat of the Convention on Biological Diversity, *Key Messages from the Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change* (2009) at 1.

disputed.

Moreover, due to climate change, hydrological and meteorological events such as heavy rain, flash floods, hurricanes, typhoons and storm surges have increased the frequency of disasters. As a result, sites around the world, especially in coastal areas below sea level, are more vulnerable than ever to being inundated by seawater. In addition, climate change has led to increased temperatures and increased fire incidents, making the cultural heritage of forested areas more risky than ever before.

In Article 1 of *Convention Concerning the Protection of the World Cultural and Natural Heritage*⁸⁷, it provides “for the purpose of this Convention, the following shall be considered as ‘cultural heritage’: monuments: architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding universal value from the point of view of history, art or science; groups of buildings: groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view of history, art or science; sites: works of man or the combined works of nature and man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view.” Article 2 provides that “for the purposes of this Convention, the following shall

⁸⁷ Convention Concerning the Protection of the World Cultural and Natural Heritage, 16 November 1972, UNTS 1977 No 15511, (entered into force 17 December 1975), online: <https://whc.unesco.org/archive/convention-en.pdf>.

be considered as ‘natural heritage’: natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view; geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation; natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty.” We can see that in the *Convention Concerning the Protection of the World Cultural and Natural Heritage*, it divides the world heritage into two categories: cultural heritage and natural heritage. Cultural Heritage can be distinguished in: Built Environment (Buildings, Townscapes, Archaeological remains); Natural Environment (Rural landscapes, Coasts and shorelines, Agricultural heritage); Artefacts (Books & Documents, Objects, Pictures). Driving force behind all definitions of Cultural Heritage is: it is a human creation intended to inform.⁸⁸ “The existing international conventions, recommendations and resolutions concerning cultural and natural property demonstrate the importance, for all the peoples of the world, of safeguarding this unique and irreplaceable property, to whatever people it may belong. Parts of the cultural or natural heritage are of outstanding interest and therefore need to be preserved as part of the world heritage of mankind as a whole.”⁸⁹

Cultural heritage is gradually unable to withstand the damage caused by climate

⁸⁸ “What is Cultural Heritage”, online: *Culture in Development* <http://www.cultureindevelopment.nl/Cultural_Heritage/What_is_Cultural_Heritage>.

⁸⁹ Convention Concerning the Protection of the World Cultural and Natural Heritage, 16 November 1972, UNTS 1977 No 15511, (entered into force 17 December 1975).

change, which will affect the value of cultural heritage and the future understanding and protection of cultural heritage. “For example, Hoi An Ancient Town, situated on the banks of the Thu Bon River in Viet Nam’s central Quang Nam province, Hoi An is an exceptionally well-preserved example of a Far Eastern trading port that was active from the 15th to the 19th centuries. The old town has more than 1 100 wood-framed buildings, 800 of which date from the 16th and 17th centuries. Tourism is the main economic activity in the city and has surged since its listing as a World Heritage site, with the average number of tourists increasing by 20 percent year on year from 2003 to 2010. The city is prone to flooding during the annual rainy season, but climate change is expected to worsen conditions considerably in the future. Much of An Hoi is at or no more than 2 meters above sea level, so is vulnerable to sea-level rise, storm surges during typhoons, and coastal erosion.”⁹⁰

In addition, sea level rise caused by climate change has inundated some countries’ territories and may even drown them all, and some small island countries are about to disappear. The existence of a general State has four elements: first, people; second, land settled by people; third, there is a government; fourth, there is a sovereign government.⁹¹ Climate change-induced sea-level rise has inundated the territory of some countries, possibly even all of them, eventually leading to the disappearance of international personalities, that is, small island States. This is undoubtedly the most serious damage to small island States. It should also be noted that loss and damage can

⁹⁰ See Adam Markham et al, *World heritage and tourism in a changing climate* (UNESCO Publishing, 2016).

⁹¹ See Guimei Bai, *International Law* (Beijing: Peking University Press, 2015). See also Chengyuan Ma, *International Law* (Beijing: Renmin University Press, 2019).

affect efforts to eradicate poverty and achieve sustainable development. The loss and damage caused by climate change not only endanger the interests of contemporary people, but also seriously hinder the sustainable development of small island countries and harm the interests of their future generations. In 2002, Tuvalu wanted to sue Australia and the United States over their greenhouse gas emissions. It said some of their islands have been flooded by rising sea levels caused by greenhouse gas emissions.⁹² In the period, Tuvalu was busy lobbying other island States from around the world. It wanted their help to launch a world court lawsuit against the two developed nations. Tuvalu considered Australia is the biggest per capita producer of greenhouse gases, and the United States is the world's single biggest polluter of such gases. In 2001, these concerns drove Tuvalu to last year request Australia and New Zealand to open their doors for its citizens to immigrate if they face imminent danger. New Zealand agreed to plan a 30-year immigration program. But Australia's Immigration Minister, Philip Ruddock, said this action was based on speculation. Australia committed to take its own measures to try to meet its Kyoto targets.⁹³

The adverse consequences of climate change are increasing in all regions of the world, and may even cause the sinking of some small island countries, resulting in the reduction of the main body of international law and further affecting the world pattern. As can be seen from the above, the adverse consequences of climate change affect human life and health and threaten the protection of human rights by the international

⁹² See "Tuvalu steps up threat to sue Australia, U.S.", online: <<http://tuvaluislands.com/news/archived/2002/2002-09-10.htm>>.

⁹³ See Innocenti, *supra* note 62.

community. At the same time, climate change has adverse consequences on biodiversity, mainly manifested in habitat degradation and species reduction. Biodiversity is the wealth of all mankind and plays an important role in the existence and development of mankind. Therefore, the *Convention on Biological Diversity* provides a principled provision for the protection of biodiversity. As the world cultural and natural heritage of human common memory, under the influence of climate change, loss and damage have also occurred. According to *Convention Concerning the Protection of the World Culture and Natural Heritage*, human beings should respond to such loss and damage. These international conventions do not directly stipulate the adverse consequences of climate change, but they embody the protection of human rights, biodiversity and the world cultural and natural heritage. In the following section, we will study international conventions and agreements that specifically address the adverse effects of climate change.

1.1.3 Loss and Damage in international climate change law

For the first time, the term “loss and damage associated with climate change impacts” appeared in the Bali Action Plan adopted by the Thirteenth Meeting of the Parties in 2007. In 2010, the Cancun Adaptation Framework made a specific list of loss and damage. The Warsaw Climate Change Conference proposed the establishment of an international mechanism for the loss and damage related to climate change. The Paris Agreement proposes measures to avoid, minimize and deal with loss and damage associated with the adverse effects of climate change. These discussions on loss and

damage have focused on how to take measures to deal with such loss and damage without a uniform definition of what is the loss and damage caused by climate change. However, the impact of loss and damage is increasing, and the number of times mentioned in climate change law is also increasing.

The UNFCCC: “Intergovernmental Negotiating Committee (INC) first met in February 1991 and its government representatives adopted the *United Nations Framework Convention on Climate Change*, after just 15 months of negotiations, on 9 May 1992. At the Rio de Janeiro United Nations Conference on Environment and Development (or Earth Summit) of June 1992, the new Convention was opened for signature. It entered into force on 21 March 1994.”⁹⁴ “The Convention divides countries into three main groups with differing commitments: Annex I, Annex II, Non-annex I. Annex I Parties include the industrialized countries that were members of the OECD (Organization for Economic Co-operation and Development) in 1992, plus countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States.”⁹⁵ “A requirement that affects only Annex I Parties is that they must adopt climate change policies and measures with the aim of reducing their greenhouse gas emissions to 1990 levels by the Year 2000. Annex II Parties consist of the OECD members of Annex I, but not the EIT Parties. They are required to provide financial resources to enable developing countries to undertake emissions reduction activities under the Convention

⁹⁴ Climate Change Secretariat, “Uniting on Climate A guide to the Climate Change Convention and the Kyoto Protocol” (2007) at 14, online: <https://unfccc.int/resource/docs/publications/unitingonclimate_eng.pdf>.

⁹⁵ “Parties & Observers | UNFCCC”, online: <<https://unfccc.int/parties-observers>>.

and to help them adapt to adverse effects of climate change. In addition, they have to “take all practicable steps” to promote the development and transfer of environmentally friendly technologies to EIT Parties and developing countries. Non-annex I Parties – as they are termed for ease of reference – are mostly developing countries. Certain groups of developing countries are recognized by the Convention as being vulnerable to the adverse impacts of climate change, including countries with low-lying coastal areas and those prone to desertification and drought. Others (such as countries that rely heavily on income from fossil fuel production and commerce) feel more vulnerable to the potential economic impacts of climate change response measures.”⁹⁶

The *UNFCCC*, in its Article 1, defines that “‘adverse effects of climate change’ means changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare.”⁹⁷ Article 3.1 of the *UNFCCC* establishes the notion “common but differentiated responsibility”. It provides “the Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof.”⁹⁸ Article 3.1 not

⁹⁶ *Supra* note 94 at 15.

⁹⁷ See United Nations Framework Convention on Climate Change, 4 June 1992, UNTS, (entered into force 21 March 1994), online: <https://unfccc.int/resource/docs/convkp/conveng.pdf>.

⁹⁸ See *Ibid.*

only refers to the capacity of industrialized countries to mitigate climate change, but also establishing the leadership role with respect to climate change damage.⁹⁹ Article 3.3 of the *UNFCCC* provides the precautionary principle: “the Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties.”¹⁰⁰ Lack of scientific certainty cannot be used as an excuse to postpone such measures where there are threats of “serious or irreversible” damage. It is important to note that the precautionary principle not only applies to the prevention of climate change but also to the “mitigation of its adverse effects”, i.e. to adaptation measures.¹⁰¹ Article 4.1(b) provides that “all Parties formulate, implement, publish and regularly update national and, where appropriate, regional programs containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and

⁹⁹ Roda Verheyen, *Climate change damage and international law: prevention, duties and state responsibility* (Leiden ; Boston: MNijhoff ; Brill, 2005) at 69.

¹⁰⁰ See *supra* note 97.

¹⁰¹ Verheyen, *supra* note 99 at 74.

measures to facilitate adequate adaptation to climate change.”¹⁰² At this time, UNFCCC put the adaptation obligation after mitigation, and it made clear the adaptation obligation of each country. UNFCCC has laid down the principles and pointed out the direction for jointly dealing with the adverse effects of climate change. The Kyoto Protocol reached in 1997 has made substantial progress. It has formulated the implementation mechanism, set specific emission reduction targets, and realized the transformation from the emission reduction system under the framework to a legally binding mechanism. The substantive progress of the Kyoto Protocol will be analyzed in detail below.

Kyoto Protocol: “The *Kyoto Protocol* is an international agreement linked to the *United Nations Framework Convention on Climate Change*, which commits its Parties by setting internationally binding emission reduction targets. The *Kyoto Protocol* was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. The detailed rules for the implementation of the Protocol were adopted at COP 7 in Marrakesh, Morocco, in 2001, and are referred to as the “Marrakesh Accords.” Its first commitment period started in 2008 and ended in 2012.”¹⁰³ In Doha, Qatar, on 8 December 2012, the “Doha Amendment to the Kyoto Protocol”¹⁰⁴ was adopted. “The amendment includes: new commitments for Annex I Parties to the *Kyoto Protocol* who agreed to take on commitments in a second commitment period from 1 January 2013

¹⁰² See *supra* note 97.

¹⁰³ See UNFCCC, “What is the Kyoto Protocol? | UNFCCC”, (2020), online: *What Kyoto Protoc* <https://unfccc.int/kyoto_protocol>.

¹⁰⁴ Doha Amendment to the Kyoto Protocol, 8 December 2012, online: https://unfccc.int/files/kyoto_protocol/application/pdf/kp_doha_amendment_english.pdf.

to 31 December 2020; A revised list of greenhouse gases (GHG) to be reported on by Parties in the second commitment period; and Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.”¹⁰⁵

In keeping with the *UNFCCC*, the *Kyoto Protocol*¹⁰⁶ in Article 3 provides that “the Parties included in Annex I shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B and in accordance with the provisions of this Article, with a view to reducing their overall emissions of such gases by at least 5 percent below 1990 levels in the commitment period 2008 to 2012.”¹⁰⁷ The Kyoto Protocol complements the *UNFCCC* and is an important tool to effectively prevent climate change damage through mitigation measures aimed at achieving the objective of the *UNFCCC*. In Article 12.1 and 12.2 of the *Kyoto Protocol*, it provides “a clean development mechanism is hereby defined. The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.” Article 12.8 of *Kyoto Protocol* provides “the Conference of the Parties

¹⁰⁵ Climate Change Secretariat, *supra* note 94.

¹⁰⁶ See Kyoto Protocol, December 1997, UNTS, (entered into force 16 February 2005), online: <https://unfccc.int/resource/docs/convkp/kpeng.pdf>.

¹⁰⁷ Antonio G. M. La Vina, *supra* note 23.

...serving as the meeting of the Parties to this Protocol shall ensure that a share of the proceeds from certified project activities is used to cover administrative expenses as well as to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation.”¹⁰⁸ The “share of the proceeds” does not link the funding to the non-compliance of Parties. Funds are earmarked for adaptation and administrative costs, and they are only for the “particularly vulnerable” countries. Mitigation projects are not be funded through this special mechanism.

Issues on climate change have received significant attention from governments and nongovernmental actors since 1997, the year of which was marked by the conclusion of a historic agreement to reduce emissions of greenhouse gases pursuant to the Kyoto Protocol to the *UNFCCC*. The Kyoto Protocol sets emission reduction requirements of all countries as a goal with legal effect. Although the Kyoto Protocol does not explicitly put forward the loss and damage caused by climate change, it fully follows the *UNFCCC* goal, i.e., to deal with the “adverse effects of climate change” by cutting down greenhouse gas emissions.

Among the three mechanisms established by the Kyoto Protocol, the clean development mechanism is the only one that can be participated in by the developing countries. The CDM is purposed to assist parties not included in Annex I (mainly the developing countries) to achieve the ultimate goal of sustainable development and

¹⁰⁸ *Ibid.*

benefit the UNFCCC, while it is also supposed to assist parties included in Annex I to achieve their quantified emission limitation and reduction commitments under Articles 3-12 of the Kyoto Protocol on the cost of adaptation as mentioned above. They require the developed countries to assist the developing ones that are particularly vulnerable to the adverse effects of climate change to bear the costs of adaptation. It can be found that both mitigation and adaptation are emphasized, while also laying a foundation for the establishment of adaptation framework in the future. From that time, the international community began to pay more attention to the assistance by developed countries to developing countries in terms of adaptation policies.

Cancun Adaptation Framework: In 2010, the 16th Conference of the Parties to the UNFCCC established the Cancun Adaptation Framework with the objective of enhancing action on adaptation, including through international cooperation and coherent consideration of matters relating to adaptation under the Convention.¹⁰⁹ It recognizes the need to strengthen international cooperation and expertise in order to understand and reduce loss and damage associated with the adverse effects of climate change, including impacts related to extreme weather events and slow onset events.¹¹⁰

In the Cancun Agreements, there is a shared vision for long-term cooperative action. “All Parties share a vision for long-term cooperative action in order to achieve the objective of the Convention under its Article 2, including through the achievement

¹⁰⁹ See *Report of the Conference of the Parties on its sixteenth session*, Official Records FCCC/CP/2010/7/Add.1 (Cancun: UN, 2010), online: <https://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf>.

¹¹⁰ *Report of the Conference of the Parties on its sixteenth session*, Official Records FCCC/CP/2010/7/Add.1 (Cancun: UN, 2010) at 6.

of a global goal, on the basis of equity and in accordance with common but differentiated responsibilities and respective capabilities; this vision is to guide the policies and actions of all Parties, while taking into full consideration the different circumstances of Parties in accordance with the principles and provisions of the Convention; the vision addresses mitigation, adaptation, finance, technology development and transfer, and capacity-building in a balanced, integrated and comprehensive manner to enhance and achieve the full, effective and sustained implementation of the Convention, now, up to and beyond 2012.”¹¹¹ “It affirms that: (a) Scaled-up overall mitigation efforts that allow for the achievement of desired stabilization levels are necessary, with developed country Parties showing leadership by undertaking ambitious emission reductions and providing technology, capacity-building and financial resources to developing country Parties, in accordance with the relevant provisions of the Convention; (b) Adaptation must be addressed with the same priority as mitigation and requires appropriate institutional arrangements to enhance adaptation action and support; (c) All Parties should cooperate, consistent with the principles of the Convention, through effective mechanisms, enhanced means and appropriate enabling environments, and enhance technology development and the transfer of technologies to developing country Parties to enable action on mitigation and adaptation; (d) Mobilization and provision of scaled-up, new, additional, adequate and predictable financial resources is necessary to address the adaptation and mitigation needs of developing countries.”¹¹²

¹¹¹ *Ibid* at 2.

¹¹² *Ibid* at 3.

Adaptation is a challenge faced by all Parties, and the enhanced action and international cooperation for adaptation is urgently required to enable and support the implementation of adaptation actions aimed at reducing vulnerability and building resilience in developing country Parties, so as to meet the urgent and immediate needs of those developing countries that are particularly vulnerable. Such enhanced action for adaptation should be undertaken in accordance with the Convention, while following a country-driven, gender-sensitive, participatory and fully transparent approach and taking into consideration vulnerable groups, communities and ecosystems; further, such action should be based on and guided by the best available science and, as appropriate, traditional and indigenous knowledge, with a view to integrating adaptation into relevant social, economic and environmental policies and actions, where appropriate. The Conferences of Parties established the Cancun Adaptation Framework, which encompasses the provisions laid out below, with an objective to enhance measurements about adaptation, including taking international cooperation and coherent consideration of matters relating to adaptation under the Convention.

“All Parties should enhance action on adaptation under the Cancun Adaptation Framework, taking into account their common but differentiated responsibilities and respective capabilities, and specific national and regional development priorities, objectives and circumstances, by undertaking, inter alia, the following: (a) Planning, prioritizing and implementing adaptation actions, including projects and programs, and actions identified in national and subnational adaptation plans and strategies, national adaptation programs of action of the least developed countries, national

communications, technology needs assessments and other relevant national planning documents; (b) Impact, vulnerability and adaptation assessments, including assessments of financial needs as well as economic, social and environmental evaluation of adaptation options; (c) Strengthening institutional capacities and enabling environments for adaptation, including for climate-resilient development and vulnerability reduction.”¹¹³

The Cancun Adaptation Framework mentions the extension of loss and damage associated with the adverse effects of climate change, while it emphasizes the status of international cooperation. The Cancun Adaptation Framework puts adaptation actions before mitigation actions, and it emphasizes the importance of adaptation actions. As we know, the mitigation measures under the climate change regime do not work well for addressing the loss and damage. In the long run, reducing greenhouse gas emissions is an important strategy. However, in the current situation, the accumulation of greenhouse gases is still increasing the adverse consequences, so adaptation policy should be more important. Consequently, policymakers must focus not only on mitigating emissions, but also on adapting to climate change.¹¹⁴ Warsaw International Mechanism: the Alliance of Small Island States (AOSIS) ¹¹⁵ put forward a new “Multi-Window Mechanism” to address Loss and Damage from Climate Change Impacts. This “Multi-Window Mechanism” would consist of three inter-dependent components:

¹¹³ *Ibid at 4.*

¹¹⁴ Alice Kaswan, “Climate Change Adaptation and Land Use: Exploring the Federal Role” (2013) 47 J Marshall Rev 509 at 509, 510.

¹¹⁵ Alliance of Small Island States (AOSIS) is a coalition of small islands and low-lying coastal countries that share similar development challenges and concerns about the environment, especially their vulnerability to the adverse effects of global climate change. It functions primarily as an ad hoc lobby and negotiating voice for small islands developing States (SIDS) within the United Nations system, online: <http://aosis.org/about/>.

Insurance Component; Rehabilitation/Compensatory Component; Risk Management Component. These three components play different and complementary roles and comprise necessary components of an integrated approach to risk reduction, risk transfer and risk management efforts. Taken together, the three components aim to enhance adaptive capacity.¹¹⁶ LDCs said that the impact of climate change already inflicted Loss and Damage that current levels of mitigation and adaptation can't address. It also called for urgent action including the establishment of an international mechanism to enhance action and support to help developing countries to address the Loss and Damage issue. It called for the functions and modalities of an international mechanism to be established in Warsaw.¹¹⁷ Developing countries require a portfolio of mechanisms, which may include insurance, to manage risks, as no one mechanism can meet the range of circumstances required by all countries.¹¹⁸ There is a wide range of insurance models, from informal social arrangements, community schemes such as microinsurance and mutual insurance, to formal insurance where funds are collected by a profit-making third party, and reinsurance, which accepts risks that are too severe for smaller schemes or operators to retain.¹¹⁹

Under the Cancun Adaptation Framework, the “Warsaw International Mechanism on Loss and Damage” was eventually formed at the 19th Conference of the Parties to

¹¹⁶ See Alliance of Small Island States (AOSIS), *Multi-Window Mechanism to Address Loss and Damage from Climate Change Impacts*, Official Records (UNFCCC, 2008) at 1, online: http://UNFCCC.int/files/kyoto_protocol/application/pdf/aosisinsurance061208.pdf.

¹¹⁷ United Nations Climate Change Talks, United Nations Framework Convention on Climate Change (Organization) & Third World Network, *Warsaw news updates and climate briefings ; November 2013* (2014) at 13.

¹¹⁸ *Mechanisms to manage financial risks from direct impacts of climate change in developing countries*, Official Records FCCC/TP/2008/9 (United Nations, 2008) at 1, online: <https://UNFCCC.int/resource/docs/2008/tp/09.pdf>.

¹¹⁹ *Ibid* at 6.

the *UNFCCC* in 2013. At the 19th Conference of the Parties, all Parties had another debate and expressed their positions and views on the new international mechanism. Developing countries negotiating at the 19th Conference of the Parties have repeatedly stated that creating an international mechanism under UNFCCC to address loss and damage is the biggest expectation they have of the Warsaw meeting. “G77+China proposed an idea to provide the basis of negotiations for creating such an international mechanism for loss and damage, which called for this issue to be treated as a third, separate, pillar in the UNFCCC process, in addition to mitigation and adaptation.”¹²⁰ “But developed countries have been reluctant to give such a prominent role under UNFCCC to loss and damage. For example, according to USA, its negotiating position at the 19th Conference of the Parties said that accepting loss and damage as a third pillar would mean “focusing on blame and liability”. That is, developed countries would have to accept historical responsibility for emissions causing climate change and commit to paying the price. UK confirmed its support for the developed countries’ resistance. It does not accept the argument on compensation. It considers the compensation analysis is fair and sensible, but it does not mean that UK are not committed to helping the poorest countries adapt.”¹²¹

The main measures of UNFCCC are aimed at mitigation and adaptation. “It can be said that the two pillars of UNFCCC are mitigation and adaptation. At the 19th conference of the parties, developing countries proposed “loss and damage” as an

¹²⁰ “G77 Walk-out at COP19 as Rich Countries Use Delaying Tactics | Inter Press Service”, online: <<http://www.ipsnews.net/2013/11/g77-walk-out-at-cop19-as-rich-countries-use-delaying-tactics/>>.

¹²¹ *Ibid* at 77.

independent pillar. They want to separate the concept of “loss and damage” from others. The developed countries did not agree. The developed countries are not willing to separate this concept and give it an independent status. They are mainly worried about the historical responsibility or compensation liability for loss and damage. At the same time, the report of the 19th conference of the parties pointed out that the establishment of the Warsaw International Mechanism was under the Cancun adaptation framework. In other words, both developing and developed countries agree that the response measures of the Warsaw International Mechanism are essentially adaptation measures. Warsaw International Mechanism shall fulfil the role under the UNFCCC of promoting the implementation of approaches to address loss and damage associated with the adverse effects of climate change.”¹²² It is an international implementation of Article 4 of the United Nations Framework Convention on Climate Change. It is not a punitive, adversarial compensation mechanism, nor a compensation mechanism. At this time, Warsaw International Mechanism is still under the leadership of UNFCCC, but with the emergence of Paris Agreement, it gave Warsaw International Mechanism a new status.

Paris Agreement: In December 2015, a binding agreement, the *Paris Agreement* was adopted at the Conference of the Parties to the *UNFCCC*. In Article 8, it provided “Parties recognize the importance of averting, minimizing and addressing Loss and Damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in

¹²² Report of the Conference of the Parties on its nineteenth session, Official Records FCCC/CP/2013/10/Add.1 (Warsaw: United Nations, 2013) at 6, online: <https://unfccc.int/documents?f%5B0%5D=conference%3A3667&f%5B1%5D=conference%3A3936&search=&page=0%2C0%2C1>.

reducing the risk of Loss and Damage. The Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts shall be subject to the authority and guidance of the Conference of the Parties serving as the meeting of the Parties to this Agreement and may be enhanced and strengthened, as determined by the Conference of the Parties serving as the meeting of the Parties to this Agreement.”

The Conference of the Parties after the Paris Agreement stressed the importance of the Warsaw International Mechanism. Under it, Parties were required to formulate and implement relevant national plans and strategies to seek to avoid, minimize and deal with loss and damage and reduce disaster risk. The Conference of Parties continued to reaffirm the role of the Executive Committee of the Warsaw International Mechanism in guiding the implementation of its functions. So far, Warsaw International Mechanism has been given a very important position in dealing with loss and damage. The specific analysis will be followed in succession.

1.2 The definition of the Loss and Damage caused by climate change

On 2 February 2018, the International Court of Justice issued a landmark judgment on compensation for environmental damages in *Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicaragua)*¹²³, Compensation Owed by the

¹²³ This case is the judgment of the International Court of justice on environmental damage in recent two years. It is different from “case concerning pump mills on the river Uruguay (Argentina v. Uruguay)”. The special feature of this case lies in the fact that the International Court of justice has for the first time made a judgment of over compensation to the injured State for environmental damage. However, in “case concerning pump mills on the river Uruguay (Argentina v. Uruguay)”, the International Court of justice did not make a compensation judgment for environmental damage, but only required the relevant countries to comply with the procedural prior notice

Republic of Nicaragua to the Republic of Costa Rica. In 2010, Costa Rica contended that Nicaragua had occupied the territory of Costa Rica in connection with the construction of a canal from the San Juan River to Laguna los Portillos, and carried out certain related works of dredging on the San Juan River. Costa Rica consider that the dredging and the construction of that canal would seriously affect the flow of water to the Colorado River of Costa Rica, and would cause further damage to Costa Rican territory. The Court observes that, in the present case, the compensation to be awarded to Costa Rica is divided into two parts: compensation for environmental damage and compensation for costs and expenses incurred by Costa Rica in connection with Nicaragua's unlawful activities. The Court considers that Costa Rica is not entitled to pre-judgment interest on the amount of compensation for environmental damage; in determining the overall valuation of environmental damage, the Court has taken full account of the impairment or loss of environmental goods and services in the period prior to recovery.¹²⁴

It's a new decision of the International Court of Justice, Moreover, in this case, environmental damage was discussed again, and the issue of environmental damage became the focus of attention again. In the case of Costa Rica v. Nicaragua, ICJ did not adopt Costa Rica's theory of an "ecosystem approach"¹²⁵ to damage assessment, and neither did it adopt Nicaragua's position that "replacement costs"¹²⁶ be used to estimate

obligation.

¹²⁴ ICJ, 02/02/2018, No. 150, Costa Rica v Nicaragua (available on <https://www.icj-cij.org/en/case/150>).

¹²⁵ Costa Rica explains that, according to the ecosystem services approach, the value of an environment is comprised of goods and services that may or may not be traded on the market. Goods and services that are traded on the market (such as timber) have a "direct use value" whereas those that are not (such as flood prevention or gas regulation) have an "indirect use value".

¹²⁶ According to Nicaragua, the proper method for calculating this value is by reference to the price that would

environmental damages.¹²⁷ In adjudging compensation for environmental damages caused by Nicaragua to Costa Rica, the ICJ took a rather ‘incrementalist’ approach to quantification and empirical proof for every head of damage asserted – a methodologically ambiguous and context-sensitive approach which is not easily replicable for future environmental cases, given the complex nature of environmental damages in any given dispute.¹²⁸ The International Court of justice did not name its methodology. It takes into account the reasonable factors put forward by two countries and makes a judgment based on the reasonable factors. This case is the first time for the International Court of justice to make a judgment on environmental damage, because the fuzziness of methodology also brings difficulties to the later cases. The International Court of justice did not put forward a clear definition of environmental damage, but only discussed the amount of compensation, which is a defect and also a problem worthy of consideration.

Defining environmental damage remains a complex issue. In defining environmental damage, treaties and state practice reflect various approaches. A narrow definition of environmental damage is limited to damage to natural resources alone (air, water, soil, fauna and flora, and their interaction); a more extensive approach includes damage to natural resources and property that forms part of the cultural heritage; the

have to be paid to preserve an equivalent area until the services provided by the impacted area have recovered.

¹²⁷ ICJ, 02/02/2018 *Costa Rica v. Nicaragua*, *supra* note 124.

¹²⁸ Diane Desierto, “EJIL: Talk! – Environmental Damages, Environmental Reparations, and the Right to a Healthy Environment: The ICJ Compensation Judgment in Costa Rica v. Nicaragua and the IACtHR Advisory Opinion on Marine Protection for the Greater Caribbean”, online: <<https://www.ejiltalk.org/environmental-damages-environmental-reparations-and-the-right-to-a-healthy-environment-the-icj-compensation-judgment-in-costa-rica-v-nicaragua-and-the-iacthr-advisory-opinion-on-marine-protection/>>.

most extensive definition includes landscape and environmental amenity.¹²⁹ At present, no one explicitly puts forward the loss and damage caused by climate change as a kind of environmental damage. However, before people discuss what is the loss and damage caused by climate change, people need to understand the characteristics of environmental damage. The loss and damage caused by climate change are special, but it is still closely related to environmental damage. After exploring the characteristics of environmental damage, this section will summarize the characteristics of loss and damage caused by climate change.

1.2.1 Defining the Loss and Damage

As significant loss and damage from climate change increases, so does the need to consider how international law bears upon the issue. The international community has committed itself to increasing efforts to develop international law on liability and compensation for the victims of pollution damage.¹³⁰ The Bali Action Plan, in the 13th Conference of the Parties in 2007, officially appeared the words “loss and damage associated with climate change impacts” for the first time. In 2010, the Cancun Adaptation Framework put forward the specific scope of the Loss and Damage. In 2013, “Warsaw International Mechanism on Loss and Damage” shall fulfil the role under the *UNFCCC* of promoting the implementation of approaches to address Loss and Damage.

¹²⁹ Philippe Sands, *Principles of international environmental law*, 3rd ed. (Cambridge ; New York: Cambridge University Press, 2012) at 706.

¹³⁰ Roda Verheyen & Peter Roderick, “Beyond Adaptation: The legal duty to pay compensation for climate change damage” (2008) WWF-UK at 13, online: http://assets.wwf.org.uk/downloads/beyond_adaptation_lowres.pdf.

The Paris Agreement re-emphasizes the important position of the Warsaw International Mechanism. Some scholars also put forward the ideas about addressing the Loss and Damage, for example, we can establish a Compensation Fund or Commission, similar to the UN Claims Commission established to handle claims against Iraq for war-related damage, including environmental damage and depletion of natural resources.¹³¹ Countries should establish the system of responsibility for compensation for transboundary harm arising from climate change. It should be guided by the rules of international law, the rules of state responsibility and the international law of compensation for environmental pollution damage.¹³² The conventions, agreements and scholars' ideas focusing on how to take measures to deal with such Loss and Damage caused by climate change without the definition or the characteristics of the Loss and Damage.

In the *Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment (1993)*¹³³, “ ‘Damage’ means: a. loss of life or personal injury; b. loss of or damage to property other than to the installation itself or property held under the control of the operator, at the site of the dangerous activity; c. loss or damage by impairment of the environment in so far as this is not considered to be damage within the meaning of sub-paragraphs a or b above provided that compensation for impairment of the environment, other than for loss of profit from such impairment,

¹³¹ Michael B Gerrard & Gregory E Wannier, *Threatened island nations : legal implications of rising seas and a changing climate* (Cambridge: Cambridge University Press, 2014) at 443.

¹³² Jiang Xiaoyi, Qin Tianbao, “Climate Change Caused by Transboundary Damage Compensation Analysis” (2012) 11 *Learn Forum* 72 at 74, 75.

¹³³ Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment, 21 June 1993, online: <https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=090000168007c079>.

shall be limited to the costs of measures of reinstatement actually undertaken or to be undertaken; d. the costs of preventive measures and any loss or damage caused by preventive measures. To the extent that the loss or damage referred to in sub-paragraphs a to c of this paragraph arises out of or results from the hazardous properties of the dangerous substances, genetically modified organisms or micro-organisms or arises or results from waste.”¹³⁴ In the *Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety(2000)*¹³⁵, “ ‘Damage’ means an adverse effect on the conservation and sustainable use of biological diversity, taking also into account risks to human health, that: (i) is measurable or otherwise observable taking into account, wherever available, scientifically-established baselines recognized by a competent authority that takes into account any other human induced variation and natural variation; and (ii) is significant as set out in paragraph 3 below. In paragraph 3, a “significant” adverse effect is to be determined on the basis of factors, such as: (a) the long-term or permanent change, to be understood as change that will not be redressed through natural recovery within a reasonable period of time; (b) the extent of the qualitative or quantitative changes that adversely affect the components of biological diversity; (c) the reduction of the ability of components of biological diversity to provide goods and services; (d) the extent of any adverse effects on human health in the context of the Protocol.”¹³⁶

¹³⁴ See Article 2 of Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment. The Convention has never entered into force, but its provision can give an example.

¹³⁵ Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety, 29 January 2000, online: https://bch.cbd.int/protocol/NKL_text.shtml.

¹³⁶ See the Article 2 of the Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety, 29 January 2000, online: https://bch.cbd.int/protocol/NKL_text.shtml.

The *Convention on the Regulation of Antarctic Mineral Resource Activities (1988)*¹³⁷ provides that “‘Damage to the Antarctic environment or dependent or associated ecosystems’ means any impact on the living or non-living components of that environment or those ecosystems, including harm to atmospheric, marine or terrestrial life, beyond that which is negligible or which has been assessed and judged to be acceptable pursuant to this Convention.”¹³⁸ “Air Pollution” means the introduction by man, directly or indirectly, of substances or energy into the air resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems and material property and impair or interfere with amenities and other legitimate uses of the environment, and “air pollutants” shall be construed accordingly.¹³⁹ “Pollution of the marine environment” means the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.¹⁴⁰ The distinction between environmental damage and pollution is illustrated by the *Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment*, which provides that the operator shall not be liable under this Convention for damage which was caused by

¹³⁷ Convention on the Regulation of Antarctic Mineral Resource Activities, June 1988, online: https://www.ats.aq/documents/recatt/Att311_e.pdf.

¹³⁸ *Ibid.*

¹³⁹ See Convention on Long-range Transboundary Air Pollution, 1979, (entered into force in 1983), online: <https://www.unece.org/fileadmin/DAM/env/lrtap/full%20text/1979.CLRTAP.e.pdf>.

¹⁴⁰ See United Nations Convention on the Law of the Sea, United Nations Convention on the Law of the Sea, 1982, UNTS, (entered into force in 1994), online: http://www.un.org/Depts/los/convention_agreements/texts/unclos/unclos_e.pdf.

pollution at tolerable levels under local relevant circumstances.¹⁴¹ Other conventions define the consequences of activities by using the term “adverse effects”. For example, “adverse effects” means changes in the physical environment or biota, including changes in climate, which have significant deleterious effects on human health or on the composition, resilience and productivity of natural and managed ecosystems, or on materials useful to mankind.¹⁴² The *UNFCCC*, in its Article 1, defines that “adverse effects of climate change”. In 2007, the term “loss and damage associated with climate change impacts” is formally adopted for the first time in the Bali Action Plan. It is said that “disaster reduction strategies and means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change.”¹⁴³

Draft articles on Responsibility of States for Internationally Wrongful Acts (2001) provides that “injury includes any damage, whether material or moral, caused by the internationally wrongful act of a State.”¹⁴⁴ *Draft articles on Prevention of Transboundary Harm from Hazardous Activities (2001)* provides that “‘Harm’ means harm caused to persons, property or the environment.”¹⁴⁵ In the *Draft Principles on the*

¹⁴¹ See Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment, 21 June 1993, online: <<https://academic.oup.com/ulr/article-lookup/doi/10.1093/ulr/os-21.1.273>>.

¹⁴² See Vienna Convention for the Protection of the Ozone Layer, 22 March 1985, 26 ILM 1516, (entered into force 22 September 1988), online: https://treaties.un.org/doc/Treaties/1988/09/19880922%2003-14%20AM/Ch_XXVII_02p.pdf.

¹⁴³ See Report of the Conference of the Parties on its thirteenth session, Official Records FCCC/CP/2007/6/Add.1 (Bali: UN, 2007) at 4, online: <https://unfccc.int/documents?f%5B0%5D=conference%3A3399>.

¹⁴⁴ International Law Commission, Report of the International Law Commission on the work of its fifty-third session, Official Records A/56/10 (Geneva: International Law Commission, 2001), online: <http://legal.un.org/ilc/reports/>.

¹⁴⁵ International Law Commission, Report of the International Law Commission on the work of its fifty-third session, Official Records A/56/10 (Geneva: International Law Commission, 2001), online: <http://legal.un.org/ilc/reports/>.

Allocation of Loss in the case of Transboundary Harm Arising out of Hazardous Activities (2006), “ ‘Damage’ means significant damage caused to persons, property or the environment; and includes: (i) loss of life or personal injury; (ii) loss of, or damage to, property, including property which forms part of the cultural heritage; (iii) loss or damage by impairment of the environment; (iv) the costs of reasonable measures of reinstatement of the property, or environment, including natural resources; (v) the costs of reasonable response measures.”¹⁴⁶ In the Commentary of the *Draft Principles on the Allocation of Loss in the case of Transboundary Harm Arising out of Hazardous Activities (2006)* emphasizes the important role of concept, which is also the scope of “damage” which has been defined in the part of terms, it says “the present ‘use of terms’ seeks to define and set out the meaning of the terms or concepts used in the present draft principles. The definition of damage is crucial for the purposes of the present draft principles. The elements of damage are identified in part to set out the basis of claims for damage. Before identifying the elements of damage, it is important to note that damage to be eligible for compensation should acquire a certain threshold.”¹⁴⁷ Both previous drafts limit damage to persons, property or the environment. The 2006 Draft extends the scope of damage to the cost of restoration measures, essentially to achieve compensation in a more timely and effective manner. Before 2006, damage was regulated and dealt with in many fields. Some treaties were formed, and the international community did not form a unified convention system. These three drafts are also proposed by the International Law Commission to deal with the issue of

¹⁴⁶ International Law Commission, Report of the International Law Commission on the work of its fifty-eighth session, Official Records A/61/10 (Geneva: International Law Commission, 2006), online: <http://legal.un.org/ilc/reports/>.

¹⁴⁷ *Ibid.*

damage in various fields, although they are not yet binding. As for the loss and damage caused by climate change, the three drafts didn't mentioned or made a provision.

In addition to the International Law Commission's drafts contribution to the definition and treatment of damage, the cases of international dispute settlement in recent decades have also contributed to the definition and treatment of damage.

In the "Trail smelter case (United States, Canada)", the word "damage", shall mean and include such damage as the Governments of the United States and Canada may deem appreciable, and for the purposes of paragraphs (a) and (c)¹⁴⁸ hereof, shall not include occasional damage that may be caused by SO₂ fumes being carried across the international boundary in air pockets or by reason of unusual atmospheric conditions. Provided, however, that any damage in the State of Washington howsoever caused by said fumes on or after January 1, 1932, shall be the subject of indemnity by the company to any interests so damaged.¹⁴⁹ In "Case Concerning Pulp Mills on the River Uruguay (Argentina v. Uruguay)", the Argentine Republic requests the International Court of Justice to adjudge and declare that, as a result, the Eastern Republic of Uruguay must pay compensation to the Argentine Republic for the damage caused by these internationally wrongful acts that would not be remedied by that situation being restored, of an amount to be determined by the Court at a subsequent

¹⁴⁸ The report recommended of the International Joint Commission (Part I, Paragraphs (a) and (c)) is that "the company be required to proceed as expeditiously as may be reasonably possible with the works above referred to and also to erect with due dispatch such further sulphuric acid units and take such further or other action as may be necessary, if any, to reduce the amount and concentration of SO₂ fumes drifting from its said plant into the United States until it has reduced the amount by some means to a point where it will do no damage in the United States."

¹⁴⁹ *Trail smelter case (United States, Canada)*, 1941 Trail Smelter Arbitral Tribunal 1905.

stage of these proceedings.¹⁵⁰ The concerns of the riparian population relate to the major risks of pollution of the river, deterioration in biodiversity, harmful effects on health and damage to fish stocks, as well as to the extremely serious consequences for tourism and other economic interests, as a result of the construction of the two pulp mills in the circumstances described in this Application.¹⁵¹ The Court points out that the principle of prevention, as a customary rule, has its origins in the due diligence that is required of a State in its territory. It is every State's obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States. A State is thus obliged to use all the means at its disposal in order to avoid activities which take place in its territory, or in any area under its jurisdiction, causing significant damage to the environment of another State.¹⁵²

In the ICJ Compensation Judgment (*Costa Rica v. Nicaragua*), Nicaragua needs to compensate Costa Rica for its internationally wrongful acts. This case is preceded by the 2015 ICJ decision which found that disputed territory between Costa Rica and Nicaragua belonged to Costa Rica. Excavating three caños (channels) and establishing a military presence are unlawful. Nicaragua violated Costa Rica's territorial sovereignty. This finding rendered Nicaragua's activities unlawful under international law, which gave rise to an obligation of reparation by Nicaragua.¹⁵³

¹⁵⁰ ICJ, 2010, *Case Concerning Pulp Mills on the River Uruguay (Argentina v Uruguay)*, 1 (available on <https://www.icj-cij.org/files/case-related/135/10779.pdf>).

¹⁵¹ *Ibid.*

¹⁵² *Ibid.*

¹⁵³ See ICJ, 02/02/2018, No. 150, *Costa Rica v Nicaragua* (available on <https://www.icj-cij.org/en/case/150>).

In cases of alleged environmental damage, particular issues may arise with respect to the existence of damage and causation. The damage may be due to several concurrent causes, or the state of science regarding the causal link between the wrongful act and the damage may be uncertain. These are difficulties that must be addressed as and when they arise in light of the facts of the case at hand and the evidence presented to the Court. Ultimately, it is for the Court to decide whether there is a sufficient causal nexus between the wrongful act and the injury suffered.¹⁵⁴

The court ruled that Nicaragua must compensate Costa Rica for material damage, including environmental damage, caused by Nicaragua's unlawful activities in Costa Rica. The case was referred to the International Court of Justice after the parties had not successfully determined the amount of compensation acceptable. In this case, the main issue of the dispute between the parties is to determine the appropriate method of compensation for environmental damage. In this case, the International Court of Justice did not adopt the methods¹⁵⁵ of assessing environmental damage proposed by both parties, but it exercised its discretion and adopted its own method of assessment. The court finally awarded Nicaragua compensation for Costa Rica, which indicates that the court acknowledged the existence of environmental damage, and the court did not challenge Nicaragua's unlawful acts and the causal relationship of environmental damage.

The above cases all involve the discussion of the amount of compensation and the

¹⁵⁴ ICJ, 02/02/2018, No. 150, *Costa Rica v Nicaragua* (available on <https://www.icj-cij.org/en/case/150>) at 13.

¹⁵⁵ We have talked about them above.

scope of compensation. Although the scope of compensation and the remedial measures taken in each case are different, generally, the damage should involve life, health, property and environment. These issues are the focus of the International Court of justice and some arbitration institutions in determining the scope of damage. Therefore, we can think that the definition of damage can be considered from the aspects of life, health, property and environment.

1.2.2 The characteristics of the Loss and Damage

As we know the *Draft articles on Prevention of Transboundary Harm from Hazardous Activities (2001)* provides that “hazardous activities” causing transboundary harm are the “activities not prohibited by international law“. At the same time, the greenhouse gas emissions which cause the loss and damage of climate change are not illegal, so this is the common characteristics of both.

However, the loss and damage caused by climate change have unique characteristics, as follows:

(a) the subject of Loss and Damage is broad. Air resources belong to all mankind. It is not exclusive to any country or individual, and the responsibility for Loss and Damage caused by the use of air resources is also shared by all mankind. Responsibility is taken by some to include present and past emissions. This has been justified on three main grounds. “First, climate change results from the stock of accumulated historic

emissions. Second, the total amount of greenhouse gases that can be emitted to the atmosphere must be constrained (to a level determined by society's choice of global climate stabilization goal, and thus constitutes a finite common resource often loosely referred to as the 'atmospheric space' or the 'carbon budget'). Users of this resource — whether current or historical — should be accountable for depleting the resource and precluding the access of others. Third, historical emissions reflect the use of a resource from which benefits have been derived, i.e., wealth, fixed capital, infrastructure, and other assets.”¹⁵⁶

For the time being, both developed and developing countries are the main emitters of greenhouse gases, and they are the subjects for the Loss and Damage caused by climate change. Therefore, the subject of responsibility is extensive. It is the countries, international organizations or individuals that have the rights and the obligations under the international law in the international community.

(b) The Loss and Damage is serious. “The Loss and Damage caused by climate change in small island states cannot be restored, and may be irreversible and permanent, such as flooding of land, acidification of farmland by seawater, lack of biodiversity, flooding of historical and cultural landscapes, etc. It can't be recovered at the end, even if it takes a long time. Small island developing States remain a special case for sustainable development in view of their unique and particular vulnerabilities, and we

¹⁵⁶ Intergovernmental Panel on Climate Change, *Climate change 2014: mitigation of climate change: Working Group III contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York, NY: Cambridge University Press, 2014) at 318.

acknowledge that climate change and sea-level rise continue to pose a significant risk to small island developing States and their efforts to achieve sustainable development and, for some, represent the gravest threat to their survival and viability. Climate change is one of the greatest challenges of our time, and we express profound alarm that emissions of greenhouse gases continue to rise globally. We are deeply concerned that all countries, particularly developing countries, are vulnerable to the adverse impacts. In this regard, we emphasize that adaptation to climate change represents an immediate and urgent global priority.”¹⁵⁷ The Loss and Damage caused by climate change not only endanger the interests of the contemporary people, but also seriously hinder the sustainable development of some countries and harm the interests of their descendants. As a result, the Loss and Damage caused by climate change is serious.

(c) The country of conduct is also the victim country. Greenhouse gas emissions involve all countries. In the context of today’s globalization, all countries will eventually share some of the risks of climate change, and individual countries will suffer the strongest climate change impacts and even Loss and Damage due to natural conditions and development levels. The victim country is also the country with greenhouse gas emissions. This feature is also the difference between the Loss and Damage caused by climate change and other environmental damage.

In addition, the causal relationship between damage and activities is complex. There is a view that Loss and Damage caused by climate change can be regarded as a

¹⁵⁷ United Nations, *SIDS Accelerated Modalities of Action (SAMOA) Pathway*, Official Records A/69/L.6 (New York: United Nations General Assembly, 2014) at 9.

damage caused by internationally wrongful acts. For example, scholar Hannah Stallard believes that “it has been shown that there is a real possibility of establishing a breach under international law in the context of climate change damage. However, it must also be established that the breach has caused the damage. This requires the existence of a cause and effect relationship according to scientific or objective notions of physical sequence.”¹⁵⁸ The requirement of causality constitutes the basis of any claim for compensation under international law and it is the core of the claim of traditional state responsibility. But the Loss and Damage caused by climate change will not necessarily succeed. This issue has not received sufficient attention in the climate change literature, undoubtedly because of its inherent complexity. However, it is a necessary condition for deciding whether compensation can be incurred. If the injured State wishes to put forward a claim according to the international obligations or international customary law, the injured State must prove that the damage has occurred. In the context of climate change damage, proving causality requires establishing a sufficient link between behaviors and the damage. Therefore, scientific evidence is particularly important in this regard, and the court will rely on this evidence to determine causality. A universal scientific consensus identifies the causal relationship between anthropogenic greenhouse gas emissions and climate change. However, the injured State cannot prove that the Loss and Damage have a causal relationship with the conduct of a particular State. Therefore, the above mentioned Tuvalu’s lobbying of small island countries to sue Australia and the United States is no longer possible.

¹⁵⁸ Hannah Stallard, “Turning up the Heat on Tuvalu: An Assessment of Potential Compensation for Climate Change Damage in Accordance with States Responsibility under International Law” (2009) 15 *Canterb Rev* 163 at 182.

1.2.3 Conclusion

Climate change is one of the most serious challenges facing the world today. Without timely measures to reduce greenhouse gas emissions and comprehensive adaptation actions, the world will suffer more severe Loss and Damage from climate change. In order to jointly address climate change damage, countries have reached a series of international conventions such as the *United Nations Framework Convention on Climate Change*, the *Kyoto Protocol* and the Paris Agreement to adjust countries' responses to climate change.

So far, the definition of Loss and Damage has not yet reached a general consensus, and there has been controversy in global climate change negotiations. The Loss and Damage caused by climate change are widespread. United States and Canada have raised the negative effects of climate change in their countries, but the developing countries, especially the least developed countries and small island states are facing the worst results. International negotiations have always focused on enhancing understanding to assess and address the Loss and Damage of these countries.

Above, we have studied international conventions, the draft articles of the International Law Commission and cases of transboundary harm. These international conventions, drafts and cases have defined environmental damage. From these definitions, it can be seen that environmental damage involves many fields, such as life, property and environment. International law needs to define and even classify the Loss

and Damage caused by climate change in order to deal with them more effectively. A clear definition will make the measures more legally binding. At the same time, the above distinction between Loss and Damage caused by climate change and transboundary damage illustrates the necessity of the independent existence of Loss and Damage caused by climate change. It is different from the concept of transboundary damage. What's more, there are many differences between the two kinds of damage in terms of treatment measures and legal basis.

In my view, the definition can be that the actual or potential adverse consequences caused by greenhouse gas emissions which will act on the life, health, property and environment. The consequences threaten the survival and sustainable development of mankind which can be avoided or unavoidable.

Part 2 The legal response to the Loss and Damage caused by climate change

Given limited climate capacity resources, how to define the rights and obligations of all parties is the core issue in addressing climate change. Legal response, as an important part of the international legal system in responding to climate change, emphasizes the feasibility of protecting rights and fulfilling obligations. According to the principle of “common but differentiated responsibilities” and the principle of respective capabilities, the response measures need to fully consider the different situations of countries. Now that the international community is widely concerned about climate change, the most important issue is not whether it is needed to take actions, because consensus has been basically reached on this issue. The key point is how to act.

Although there are differences in territory, population, economic strength, military strength and cultural quality among different countries, the German scholar Samuel Pufendorf once asserted that all people in the natural state are equal, and the personality persons in international law are in a natural state, so they are equal.¹⁵⁹ The equality of state sovereignty¹⁶⁰ refers to the equality in law. In fact, all countries can't be exactly identical. Therefore, the sovereign equality of states recognized in international laws refers not to de facto equality, but to legal equality. In other words, all countries enjoy

¹⁵⁹ See RP Anand, “Sovereign Equality of States in International Law” (1986) 197 Recl Cours 9 at 53. See also Feng Liu, “On sovereignty and international cooperation” (2003) 2:3 J Shaoyang Univ 64 at 64.

¹⁶⁰ The equality of state sovereignty is a basic principle of modern international law. It is not only clarified in the theories of some international jurists, but also confirmed by modern international legal documents, especially the Charter of the United Nations.

equal rights and obligations under international laws. Therefore, to deal with the loss and damage caused by climate change, although the international community has stressed the historical responsibility of developed countries under UNFCCC, the international community is currently tending to prefer the idea that all countries should enjoy equal rights and perform their obligations equally.

2.1 The general ways in international environmental law to deal with reparation of the damage to the environment

Part 1 has enumerated the methods for defining or assessing damage in international environmental conventions or agreements, which also provide corresponding reparation measures for damage. While summarizing these reparation measures, this section analyzes new judgments of the International Court of Justice, and then illustrates the development of general reparation measures by case studies.

Entrusted with the mission of promoting the development and codification of international laws, the United Nations International Law Commission has conducted long-term research and codification on two issues: the State responsibility for the damage resulting from acts not prohibited by international laws, and the State responsibility for international crimes committed by States, which involves reparation measures for trans-boundary environmental damage. So far, the draft of the International Law Commission has not yet presented a systematic international convention or agreement, but it is of great significance to form and develop such

international environmental conventions. Therefore, studying the general reparation measures for environmental damage requires understanding the evolution and development of the theory of state responsibility.

2.1.1 The evolution of State Responsibility

Since the Second World War, the rapid development of science and technology has met people's growing needs, but also delivered untouchable disasters to mankind. The loss and disaster caused by the trans-boundary damage due to oil pollutions and nuclear leakages are incalculable. In the face of huge trans-boundary disasters, not only do the victims face enormous loss of life, health and property, but also the natural and social environment on which they depend for their survival has been greatly damaged, or even destroyed. Therefore, the international community has begun to pay attention to this issue, and some rules have been established in some areas to ensure timely and adequate compensation for victims of trans-boundary damage. However, such rules have not been widely applied in relevant fields of international laws, while relevant rules and systems need to be further improved. The emergence and continuous improvement of the system of state responsibility has its historical inevitability, because the system has been gradually established in the process of continuous progress of human society, the ongoing development of international law and the enhanced attention of the international community to the basic human rights of victims, including their environmental rights.

a. The contributions of the International Law Commission

The idea of developing international law by restating existing rules or by formulating new ones is not recent. In the *Principles of International Law*, Bentham envisaged that “If a citizen of the world had to prepare a universal international code, what would he propose to himself as his object? It would be the common and equal utility of all nations: this would be his inclination and his duty.”¹⁶¹ Although only specific texts accepted by Governments can constitute international law, private codification, i.e. research and proposals by various societies, institutions and individual authors, will also have a considerable impact on international law. The various draft codes and proposals are prepared by the Institut de Droit International, the International Law Association (both founded in 1873) and the Harvard Research in International Law (established in 1927), which have facilitated the work of various diplomatic conferences and they also have pushed the development of general multilateral conventions. The International Law Commission is a research institution of international law affiliated to the United Nations. On 21 November 1947, the General Assembly adopted resolution 174 (II), establishing the International Law Commission (ILC) and approving its statute.

The idea that the topic of state responsibility should be one of those which are to receive priority in the Commission’s work met with the approval of all the members. Meanwhile, some members pointed out that it was the Commission’s duty to examine all aspects of the question in the light of recent developments in international life. In

¹⁶¹ See Jeremy Bentham, *Principles of International Law* (www.WealthOfNation.com, 2015).

the past, the theory of State responsibility had been centred on the treatment of aliens. Under modern international law, State responsibility arose less in connexion with the treatment of aliens than as a result of acts which endangered or might endanger international peace, such as aggression, denial of national independence, or of exchange of friendly relations with States, and violations of provisions of the United Nations Charter.¹⁶² In the traditional international law concerning State responsibility, attention had been focused on such problems as denial of justice, the rule on the exhaustion of local remedies and indemnification. Those problems had not become obsolete but their relative importance had greatly diminished in modern international law. The Commission would of course be doing useful work by studying those problems but it should not stop there; it should go further and study particularly the problems arising in practice. Some other members expressed the view that the Commission should not confine its study to more theoretical and less controversial subjects such as general principles governing the responsibility of States. By doing so it would unduly limit the problem which the General Assembly requested it to study. Finally it was suggested that the Commission should first engage in a study of the general principles of responsibility and then proceed to a more detailed analysis within which the problems of responsibility for damage caused to aliens and its redress would find their proper place.¹⁶³ Before 1963, the review and codification of the issue of State Responsibility

¹⁶² International Law Commission, *Yearbook of the International Law Commission: Report of the International Law Commission covering the work of its Fourteenth Session*, Official Records A/CN.4/SER.A/1962/Add. I (Geneva: International Law Commission, 1962) at 188, online: <http://legal.un.org/ilc/reports/>. See also Xia Wan, "The New Development of The Liability for Transboundary Harm" (2018) 22:No.1 *Contemp Law Rev*; Zhonghai Zhou, "On international liability for transboundary damage caused by dangerous activities" (2007) 5 *J Henan Inst Polit Sci Law Manag* 68 at 69.

¹⁶³ International Law Commission, *Yearbook of the International Law Commission: Report of the International Law Commission covering the work of its Fourteenth Session*, Official Records A/CN.4/SER.A/1962/Add. I (Geneva: International Law Commission, 1962) at 188, online: <http://legal.un.org/ilc/reports/>

by the International Law Commission was mainly confined to diplomatic protection, but the International Law Commission soon realized that the study of State Responsibility should address a broader range of international obligations.¹⁶⁴ In 1963, the report of the International Law Commission referred to “the juridical nature of State Responsibility is a subject which has been extensively discussed by the authorities. There is general agreement that the juridical nature of the responsibility resulting from breaches of international obligations is similar to that of civil responsibility under municipal law.”¹⁶⁵

*Draft articles on Responsibility of States for Internationally Wrongful Acts (2001)*¹⁶⁶ served as a tool for describing the elements of the law on State Responsibility. Article 2 provides that apart from proving the breach of an obligation, a wrongful act must be attributed to a State for State Responsibility to arise.¹⁶⁷ With the development of industrial science and technology, transboundary damages arising from hazardous activities are constantly emerging. Such hazardous activities are not prohibited by international law and they do not involve any breach of an international obligation and do not constitute an internationally wrongful act. In 1978, at the 30th session of the

¹⁶⁴ See International Law Commission, *Yearbook of the International Law Commission: Report of the International Law Commission covering the work of its Fourteenth Session*, Official Records A/CN.4/SER.A/1962/Add. I (Geneva: International Law Commission, 1962), online: <http://legal.un.org/ilc/reports/>.

¹⁶⁵ International Law Commission, *Report of the International Law Commission covering the work of its fifteenth session*, State responsibility Official Records A/CN.4/163 (Geneva: International Law Commission, 1963) at 249, online: <http://legal.un.org/ilc/reports/>.

¹⁶⁶ International Law Commission, *Report of the International Law Commission on the work of its fifty-third session*, Official Records A/56/10 (Geneva: International Law Commission, 2001), online: <http://legal.un.org/ilc/reports/>.

¹⁶⁷ Lakshman D Guruswamy & Mariah Zebrowski Leach, *International environmental law in a nutshell*, fourth edition (St. Paul, MN: West Academic Press) at 91. See also International Law Commission, *Report of the International Law Commission on the work of its fifty-third session*, Official Records A/56/10 (Geneva: International Law Commission, 2001), at 34, online: <http://legal.un.org/ilc/reports/>.

International Law Commission, the topic of “international liability for injurious consequences arising out of acts not prohibited by international law” was included in the program of work. *Draft articles on Prevention of Transboundary Harm from Hazardous Activities (2001)*¹⁶⁸ and *Draft Principles on the Allocation of Loss in the case of Transboundary Harm Arising out of Hazardous Activities (2006)*¹⁶⁹ established the international liability regimes for such acts. The conduct of one State can give rise to injury within the territory of other States without violating any such rule of treaty or customary law. Responding to this challenge, the ILC has put forward a set of draft articles aimed at defining a State’s liability for damages caused by acts that are not violations of international law.¹⁷⁰

b. Application of State Responsibility

Fault. Studying the laws of various countries on torts¹⁷¹ can be seen that the elements necessary for general tort liability include: behavior, fault, damage and causation. Some special infringements do not consider whether the perpetrator is at fault. Regardless of the type of infringement, the tort liability requires three components: behavior, damage, and causation.

Article 2 of *Draft articles on Responsibility of States for Internationally Wrongful*

¹⁶⁸ International Law Commission, Report of the International Law Commission on the work of its fifty-third session, Official Records A/56/10 (Geneva: International Law Commission, 2001), online: <http://legal.un.org/ilc/reports/>.

¹⁶⁹ International Law Commission, Report of the International Law Commission on the work of its fifty-eighth session, Official Records A/61/10 (Geneva: International Law Commission, 2006), online: <http://legal.un.org/ilc/reports/>.

¹⁷⁰ Lakshman D Guruswamy & Mariah Zebrowski Leach, *supra* note 167 at 97, 98.

¹⁷¹ See Santo Davide Ferrara, *Personal Injury and Damage Ascertainment under Civil Law* (Switzerland: Springer International Publishing, 2016).

Acts (2001) specifies the conditions required to establish the existence of an internationally wrongful act of the State. “First, the conduct in question must be attributable to the State under international law. Secondly, for responsibility to attach to the act of the State, the conduct must constitute a breach of an international legal obligation in force for that State at that time.”¹⁷² The ILC’s commentary to the Draft raises a related question. “The question is whether fault constitutes a necessary element of the internationally wrongful act of a State. This is certainly not the case if by “fault” one understands the existence, for example, of an intention to harm. In the absence of any specific requirement of a mental element in terms of the primary obligation, it is only the act of a State that matters, independently of any intention.”¹⁷³

Strict Liability and Absolute Liability. Strict liability may simply constitute a reversal of the burden of proof, allowing the defending State to exclude the wrongfulness of the act or exemption from liability. Absolute liability is more decisive and prohibits or very strictly restricts evidence of exclusion. As for strict liability, when the wrongful act of the actor causes the consequences of the infringement, as long as he cannot put forward the exemption, even if he has performed reasonable attention, he still has to bear the liability for infringement. The standard of fault required by strict liability is stricter than fault liability, but it is different from absolute liability. If the actor can put forward effective excuses, he will not bear strict liability. Regarding

¹⁷² See International Law Commission, *Report of the International Law Commission on the work of its fifty-third session*, Official Records A/56/10 (Geneva: International Law Commission, 2001), online: <http://legal.un.org/ilc/reports/>.

¹⁷³ International Law Commission, *Report of the International Law Commission on the work of its fifty-third session*, Official Records A/56/10 (Geneva: International Law Commission, 2001) at 36, online: <http://legal.un.org/ilc/reports/>.

absolute liability, when the actors violate specific obligations and cause consequences of infringement, no matter whether they have fault or not, they should bear tort liability according to law. Under absolute liability, the actor's fault is usually not taken into account, and the actor cannot bring the exemption. For example, *Convention on International Liability for Damage Caused by Space Objects* distinguishes between fault liability and absolute liability.¹⁷⁴ In the case of absolute liability, the damage to the ground caused by space objects is considered. According to the liability for fault, the damage to places outside the earth's surface or to other space objects caused by spaces is considered.

In the *Draft articles on Responsibility of States for Internationally Wrongful Acts (2001)*, in addition to proving the breach of obligations, the wrongful act must be attributed to the State, whether or not it is at fault. Meanwhile, the Article 8 of the *Draft articles on Responsibility of States for Internationally Wrongful Acts (2001)* provides: "the conduct of a person or group of persons shall be considered an act of a State under international law if the person or group of persons is in fact acting on the instructions of, or under the direction or control of, that State in carrying out the conduct." Studying the State responsibility, it is difficult for us to explore the subjective fault of the country. The International Law Commission gave up the discussion of "fault" with an emphasis on "attribution to the State". The Draft says "the wrongful act must be attributed to the

¹⁷⁴ In Article 2, it provides: "a launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the earth or to aircraft flight." In Article 3, it provides: "in the event of damage being caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if the damage is due to its fault or the fault of persons for whom it is responsible." In the case of absolute liability, the damage to the ground caused by space objects is considered. About liability for fault, space objects cause damage to places outside the earth's surface or to other space objects.

State” and it doesn’t mentioned the defending State can exclude the wrongfulness of the act or exemption from liability. In the Article 39 of the *Draft articles on Responsibility of States for Internationally Wrongful Acts (2001)* provides: “in the determination of reparation, account shall be taken of the contribution to the injury by willful or negligent action or omission of the injured State or any person or entity in relation to whom reparation is sought.”¹⁷⁵ The ILC’s commentary to the Draft raises “Article 39 deals with the situation where damage has been caused by an internationally wrongful act of a State, which is responsible for the damage in accordance with articles 1 and 28, except that the injured State, or the individual victim of the breach has materially contributed to the damage by some willful or negligent act or omission. Its focus is on situations which in national law systems are referred to as ‘contributory negligence’, ‘comparative fault’, ‘faute de la victime’ ”.¹⁷⁶ “Article 39 recognizes that the conduct of the injured State, or of any person or entity in relation to who sought the reparation, should be taken into account in assessing the form and extent of reparation. This is consonant with the principle that full reparation is due for the injury—but nothing more—arising in consequence of the internationally wrongful act. It is also consistent with fairness as between the responsible State and the victim of the breach.”¹⁷⁷ In the determination of repair, the Draft refers to the contribution of the injured state, not to defend state exclude the wrongfulness of the act or exemption from liability. Therefore, in this Draft, it does not involve strict liability or absolute liability.

¹⁷⁵ International Law Commission, *Report of the International Law Commission on the work of its fifty-third session*, Official Records A/56/10 (Geneva: International Law Commission, 2001) at 109, online: <http://legal.un.org/ilc/reports/>.

¹⁷⁶ Antonio G. M. La Vina, *supra* note 23.

¹⁷⁷ *Ibid.*

Causation. Judicial remedies based on state responsibility needs to prove causation, but proving causation is difficult. In particular, in environmental damage cases, it is sometimes difficult to prove the source country of environmental pollution. For example, On January 31, 2013, severe fog and haze swept over many cities of China again, and the PM2.5 index of Beijing and other places burst again. The air quality has reached the level of severe pollution.¹⁷⁸ Japanese media expressed concern about this, saying that China's air pollution had an impact on Japan and had caused "transboundary pollution". Japanese media believe that serious air pollution in eastern China has begun to affect Japan, and some parts of Western Japan have detected excessive pollutants. However, on December 5, 2013, the Japanese media overturned previous statements, believing that PM 2.5 may not all come from China. Japan should grasp the origin of PM2.5 and take active measures. In the case that many countries are likely to be the source countries of environmental damage or environmental pollution, it is difficult for us to determine the source countries, that is to say, the proof of causation is difficult.

There is no exception to the principle stated in article 2 that there are two necessary conditions for an internationally wrongful act—conduct attributable to the State under the international law and the breach by that conduct of an international obligation of the State. The question is whether those two necessary conditions are also sufficient. It is sometimes said that international responsibility is not engaged by conduct of a State in disregard of its obligations unless some further element exists, in particular, "damage" to another State. But whether such elements are required depends on the content of the

¹⁷⁸ See Hong Wang et al, "A study of the meteorological causes of a prolonged and severe haze episode in January 2013 over central-eastern China" (2014) 98 *Atmos Environ* 146.

primary obligation, and there is no general rule in this respect.¹⁷⁹ Thus, the International Law Commission mainly takes international obligations as its main criterion in dealing with the issue of State responsibility. Violation of international obligations is one of the necessary conditions for incurring State responsibility. Causation has become a selective factor, sometimes it will be taken into account. Causation shall be governed by whether international obligations are prescribed or not.

c. International Liability

As we have already pointed out, the State Responsibility regime of the International Law Commission limits the application of State responsibility to apply only to wrongful acts. A situation in which a State has caused harm through acts prohibited by a treaty or custom. In fact, it is very likely that a country will cause damage to other countries within its jurisdiction or control. Such conduct does not violate international conventions or international customs.

In the *Draft articles on Prevention of Transboundary Harm from Hazardous Activities (2001)*¹⁸⁰, Article 1¹⁸¹ limits the scope of the articles to activities not prohibited by international law and which involve a risk of causing significant transboundary harm through their physical consequences. Article 3¹⁸² provides the

¹⁷⁹ International Law Commission, Report of the International Law Commission on the work of its fifty-third session, Official Records A/56/10 (Geneva: International Law Commission, 2001) at 36, online: <http://legal.un.org/ilc/reports/>.

¹⁸⁰ International Law Commission, Report of the International Law Commission on the work of its fifty-third session, Official Records A/56/10 (Geneva: International Law Commission, 2001), online: <http://legal.un.org/ilc/reports/>.

¹⁸¹ Article 1: the present articles apply to activities not prohibited by international law which involve a risk of causing significant transboundary harm through their physical consequences.

¹⁸² Article 3: the State of origin shall take all appropriate measures to prevent significant transboundary harm or

“prevention”, it is based on the fundamental principle *sic utere tuo ut alienum non laedas*, which is reflected in, in Principle 21 of the *Stockholm Declaration*¹⁸³ reading: “States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own natural resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.”

International Liability mainly involves the *Draft articles on Prevention of Transboundary Harm from Hazardous Activities (2001)* and it is caused by acts that do not violate international law or international obligations. The ILC’s commentary on the Article 1 of the Draft mentioned “the first criterion to define the scope of the articles refers to ‘activities not prohibited by international law’. This approach has been adopted in order to separate the topic of international liability from the topic of State responsibility. The employment of this criterion is also intended to allow a State likely to be affected by an activity involving the risk of causing significant transboundary harm to demand from the State of origin compliance with obligations of prevention although the activity itself is not prohibited.”¹⁸⁴ “The second criterion, found in the definition of the State of origin in Article 2 is that the activities to which preventive measures are applicable “are planned or are carried out” in the territory or otherwise

at any event to minimize the risk thereof.

¹⁸³ Stockholm Declaration, 16 June 1972, UNTS, online: <http://journals.sagepub.com/doi/10.1177/0019556119890340>.

¹⁸⁴ International Law Commission, Report of the International Law Commission on the work of its fifty-third session, Official Records A/56/10 (Geneva: International Law Commission, 2001), online: <http://legal.un.org/ilc/reports/>.

under the jurisdiction or control of a State. Three concepts are used in this criterion: “territory”, “jurisdiction” and “control”. Even though the expression “jurisdiction or control of a State” is a more commonly used formula in some instruments, the Commission finds it useful to mention also the concept of “territory” in order to emphasize the importance of the territorial link, when such a link exists, between activities under these articles and a State.”¹⁸⁵ “For the purposes of these articles, territorial jurisdiction is the dominant criterion. Consequently, when an activity covered by the present articles occurs within the territory of a State, that State must comply with the obligations of prevention. “Territory” is, therefore, taken as conclusive evidence of jurisdiction. Consequently, in cases of competing jurisdictions over an activity covered by these articles, the territorially based jurisdiction prevails.”¹⁸⁶

Generally speaking, the International Law Commission’s discussion on state responsibility tends to implement effective liability system, but it is not eager to establish a universal legal system of international liability. In order to compensate the victims directly from the operator, we should establish an international liability system. It is necessary to coordinate the international law and domestic law, substantive law and procedural law, so that the injured party can obtain timely and effective compensation.

As stated by the International Law Commission in its commentary, liability for transboundary damage focuses on the result of the act, not on the legality of the act.¹⁸⁷

¹⁸⁵ Antonio G. M. La Vina, *supra* note 23.

¹⁸⁶ *Ibid.*

¹⁸⁷ *Draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities, with commentaries*, Official Records, by International Law Commission, Official Records A/61/10 (the General

From the subject of responsibility, the state responsibility of a state for illegal acts is the responsibility of the state as the subject of international law, but does not include the responsibility of other non-state entities. While the responsibility of transboundary damage is the responsibility of the state, legal person, which is the responsibility of multiple subjects under the adjustment of international law system. There are a wide range of ways for the state to bear the state responsibility for illegal acts, including cessation and non-repetition; reparation; restitution; compensation; satisfaction. The main way to bear the liability for transboundary damage is compensation.¹⁸⁸

To sum up, the difference between the state responsibility caused by an internationally wrongful act and the liability for transboundary damage mainly lies in the fact that the state responsibility caused by an internationally wrongful act, while the liability for transboundary damage is due to the consequences of damage. It has nothing to do with whether it violates international law. From the perspective of the types of responsibility, the state responsibility caused by the internationally wrongful act involves a variety of remedies, while the liability for transboundary damage mainly lies in compensating the injured party.

In addition, the state responsibility of a state for an illegal act is only a responsibility in the sense of public international law, which is used to adjust the international legal relations between States, between States and international

Assembly, 2006).

¹⁸⁸ See Xia Wan, "The New Development of the Liability for Transboundary Harm" (2018) 22:No.1 Contemp Law Rev120 at 123.

organizations or between international organizations. However, the liability for transboundary damage is not simply a responsibility in public law. It is difficult to strictly regard the liability for transboundary damage as a responsibility in the sense of public international law, private international law or domestic law.

Draft articles on responsibility of states for internationally wrongful acts mainly discusses the determination of internationally wrongful acts and how to identify internationally wrongful acts as attributable to states. It also lists the types of responsibility and the reasons for exemption. The first problem to be solved in draft articles on prevention of transboundary harm from hazardous activities should be how to determine “hazardous activities” and then discuss the state’s prevention obligations. The opinion of the International Law Commission is as follows: As for the scope of hazardous activities, the United Nations International Law Commission does not consider it necessary to make a unified list of provisions. A detailed list of activities is not without problems, and its role is not considered essential. Any such list may be incomplete and may soon need to be reviewed as technology evolves. Moreover, with the exception of some extremely dangerous activities, most of which are subject to special regimes, such as those in the nuclear field or in the field of outer space activities, the risks generated by an activity are basically determined by the application of specific technologies, the specific background and the mode of operation. The committee found it difficult to include all of these elements in a general list. The scope of hazardous activities may vary in different regions, so countries may specify which activities are hazardous activities in the region through bilateral, multilateral or regional

arrangements, or in national legislation.¹⁸⁹

Draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities (2006) is a supplement to *Draft articles on Prevention of Transboundary Harm from Hazardous Activities (2001)*. The international environmental law system should focus on the prevention of environmental damage, not on the responsibility of the environmental damage. Therefore, in the whole system of liability for transboundary damage, the duty of prevention is still dominant. Once the obligation of prevention has not protected the states from being harmed, the principles stipulated in *Draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities (2006)* will promote the states to fulfill its obligations.

The Preamble of *Draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities (2006)* emphasizes the principle of Rio Declaration on environment and development. That is to say, countries should enact laws to bear the responsibility of environmental damage and compensation for victims, and should take into account the polluter pays principle to promote the internalization of environmental costs. States should be aware that even if states comply with their obligations to prevent transboundary harm, there is a risk that hazardous activities may occur causing harm to other states or their nationals. Therefore, appropriate measures should be taken to ensure that the victims get timely and adequate

¹⁸⁹ See International Law Commission, *supra* note 187.

compensation.¹⁹⁰

Principle 3 of *Draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities (2006)* clarifies the dual purpose of this draft. First, it is to ensure prompt and adequate compensation to victims of transboundary damage; and second, it is to preserve and protect the environment in the event of transboundary damage, especially with respect to mitigation of damage to the environment and its restoration or reinstatement. The ILC commentary emphasizes the importance of compensation and it said “the purpose of ensuring protection to victims suffering damage from transboundary harm has been an essential element from the inception of the topic by the Commission. In his schematic outline, Robert Q. Quentin-Baxter focused on the need to protect victims, which required “measures of prevention that as far as possible avoid a risk of loss or injury and, insofar as possible, measures of reparation”.¹⁹¹ The purpose of the establishment of principles on the allocation of loss in transboundary damage is not to establish an international liability system, but to establish fairness and justice that is conducive to protecting victims and encouraging social development and progress. The purpose of principles on the allocation of loss is to make the victims of transboundary damage get timely and adequate compensation. Its ultimate value is to establish and maintain environmental justice and environmental order. It is gradually established in the process of the continuous progress of human society. At the same time, the two draft articles have

¹⁹⁰ Huaiqiang Song, “An analysis on ‘Draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities’” (2010) 12 *Leg Syst Soc* 39 at 39. See also Benoît Mayer, “Whose Loss and Damage: Promoting the Agency of Beneficiary States” (2014) 4 *Clim* 267 at 297.

¹⁹¹ See International Law Commission, *supra* note 187.

accurately grasped the core part of the transboundary damage. They strengthen and clarifies the responsibility of the state as an environmental protector and regulator, and the state has the obligation to supervise all kinds of domestic behaviors according to domestic laws; they implement the liability of domestic operators for transboundary damage with international system.¹⁹²

In its codification work, the International Law Commission has clearly defined the relationship between this codification and other international treaties. The *Draft principles on the allocation of loss in transboundary harm* have general applicability. However, when there are special provisions, the parties concerned should apply their special provisions, and the general rule is only a supplementary rule. Principle 7 of *Draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities (2006)* provides, “development of specific international regimes”, and it said “Where, in respect of particular categories of hazardous activities, specific global regional or bilateral agreements would provide effective arrangements concerning compensation, response measures and international and domestic remedies, all efforts should be made to conclude such specific agreements. Such agreements should, as appropriate, include arrangements for industry and/or State funds to provide supplementary compensation in the event that the financial resources of the operator, including financial security measures, are insufficient to cover the damage suffered as a result of an incident. Any such funds may be designed to supplement or replace national industry-based funds.” Other principles are complementary to this special

¹⁹² See Xia Wan, “The New Development of the Liability for Transboundary Harm” (2018) 22:No.1 Contemp Law Rev120 at 121.

regimes, other principles are general guidance, and in specific areas, states deal with damage according to specific regimes.

The determination of liability for transboundary damage must be considered to be applicable to all fields of transboundary damage, and it should be effectively coordinated with the existing rules of international law. In terms of the system of transboundary damage, international law actually serves as the coordination of domestic law and international arrangements¹⁹³, and the determination of the operator's liability for damage has become an international obligation that must be fulfilled by the state. Through the connection with the state's obligations, the legitimate rights and interests of the victims of transboundary damage can be guaranteed by the international system, it is no longer subject to the different legal mechanisms of different countries. Transboundary damage may involve the accountability of international and domestic law systems. Therefore, when drawing up the draft allocation, the Commission took into account the differences in the legal systems of various countries, and it considered that to achieve a unified international system was difficult. Therefore, it combined principle 7 with other principles and proposed that the whole draft was not legally binding. The determination of liability for transboundary damage has a guiding role in the international legislation to deal with the loss and damage caused by climate change. The International Law Commission does not make a list of dangerous acts, and requires all countries to actively take preventive measures and fulfill their obligations of prevention. States need to use the draft principles as a universal guide, taking into

¹⁹³ Zhonghai Zhou, "On international liability for transboundary damage caused by dangerous activities" (2007) 5 J Henan Inst Polit Sci Law Manag 68 at 68.

account the legal systems of specific countries. The measures proposed by the international community to deal with the loss and damage caused by climate change are not unified yet. At present, we can learn some knowledge from the International Law Commission's opinions on dealing with transboundary damage.

2.1.2 The ways for the damage to the environment

First of all, the more common treatment is compensation.

Convention on International Liability for Damage Caused by Space Objects provides the way for the damage is "compensation". In the article 2 of the convention: "A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the earth or to aircraft flight."¹⁹⁴

Draft articles on Responsibility of States for Internationally Wrongful Acts (2001) provides the international obligations of the States for the damage. The State responsible for the internationally wrongful act is under an obligation to cease that act, if it is continuing; it should offer appropriate assurances and guarantees of non-repetition, if circumstances so require. The responsible State have an obligation to make full reparation for the damage caused by the internationally wrongful act. Meanwhile, in article 34, it provides "forms of reparation":

"Full reparation for the injury caused by the internationally wrongful act shall take the form of restitution, compensation and satisfaction, either singly or in combination, in accordance with the provisions of this chapter."¹⁹⁵

¹⁹⁴ See the Convention on International Liability for Damage Caused by Space Objects, 1971, UNTS, (entered into force in September 1972), online: https://www.un-ilibrary.org/outer-space/international-space-law_b35fa155-en.

¹⁹⁵ International Law Commission, Report of the International Law Commission on the work of its fifty-third 97

The purposes of *Draft Principles on the Allocation of Loss in the case of Transboundary Harm Arising out of Hazardous Activities (2006)* are to ensure prompt and adequate compensation to victims of transboundary damage; and to preserve and protect the environment in the event of transboundary damage, especially with respect to mitigation of damage to the environment and its restoration or reinstatement. In the principle 4 of the *Draft Principles on the Allocation of Loss in the case of Transboundary Harm Arising out of Hazardous Activities (2006)*:

- “1. Each State should take all necessary measures to ensure that prompt and adequate compensation is available for victims of transboundary damage caused by hazardous activities located within its territory or otherwise under its jurisdiction or control.
2. These measures should include the imposition of liability on the operator or, where appropriate, other person or entity. Such liability should not require proof of fault. Any conditions, limitations or exceptions to such liability shall be consistent with draft principle 3.
3. These measures should also include the requirement on the operator or, where appropriate, other person or entity, to establish and maintain financial security such as insurance, bonds or other financial guarantees to cover claims of compensation.
4. In appropriate cases, these measures should include the requirement for the establishment of industry-wide funds at the national level.
5. In the event that the measures under the preceding paragraphs are insufficient to provide adequate compensation, the State of origin should also ensure that additional financial resources are made available.”¹⁹⁶

Response measures. *The Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety (2010)* provides the “response measures”. It provides as follows:

- “1. Parties shall require the appropriate operator or operators, in the event of damage, subject to any requirements of the competent authority, to: (a) immediately inform the competent authority; (b) Evaluate the damage; and (c) Take appropriate response measures. 2. The competent authority shall: (a) Identify the operator which has caused

session, Official Records A/56/10 (Geneva: International Law Commission, 2001), online: <http://legal.un.org/ilc/reports/>.

¹⁹⁶ International Law Commission, Report of the International Law Commission on the work of its fifty-eighth session, Official Records A/61/10 (Geneva: International Law Commission, 2006), online: <http://legal.un.org/ilc/reports/>.

the damage; (b) Evaluate the damage; and (c) Determine which response measures should be taken by the operator. 3. Where relevant information, including available scientific information or information available in the Biosafety Clearing-House, indicates that there is a sufficient likelihood that damage will result if timely response measures are not taken, the operator shall be required to take appropriate response measures so as to avoid such damage. 4. The competent authority may implement appropriate response measures, including, in particular, when the operator has failed to do so. 5. The competent authority has the right to recover from the operator the costs and expenses of, and incidental to, the evaluation of the damage and the implementation of any such appropriate response measures. Parties may provide, in their domestic law, for other situations in which the operator may not be required to bear the costs and expenses. 6. Decisions of the competent authority requiring the operator to take response measures should be reasoned. Such decisions should be notified to the operator. Domestic law shall provide for remedies, including the opportunity for administrative or judicial review of such decisions. The competent authority shall, in accordance with domestic law, also inform the operator of the available remedies. Recourse to such remedies shall not impede the competent authority from taking response measures in appropriate circumstances, unless otherwise provided by domestic law. 7. In implementing this Article and with a view to defining the specific response measures to be required or taken by the competent authority, Parties may, as appropriate, assess whether response measures are already addressed by their domestic law on civil liability. 8. Response measures shall be implemented in accordance with domestic law.”¹⁹⁷

Draft articles on Prevention of Transboundary Harm from Hazardous Activities

(2001) underlines the “prevention” not the “compensation”:

In article 3, it says “the State of origin shall take all appropriate measures to prevent significant transboundary harm or at any event to minimize the risk thereof.” Article 9 provides the “consultations on preventive measures”: “1. The States concerned shall enter into consultations, at the request of any of them, with a view to achieving acceptable solutions regarding measures to be adopted in order to prevent significant transboundary harm or at any event to minimize the risk thereof. The States concerned shall agree, at the commencement of such consultations, on a reasonable time frame for the consultations. 2. The States concerned shall seek solutions based on an equitable balance of interests in the light of article 10. 3. If the consultations referred to in paragraph 1 fail to produce an agreed solution, the State of origin shall nevertheless take into account the interests of the State likely to be affected in case it decides to authorize the activity to be pursued, without prejudice to the rights of any State likely to be affected.”¹⁹⁸

¹⁹⁷ See Convention on International Liability for Damage Caused by Space Objects, 1971, UNTS, (entered into force in September 1972), 15 October 2010, (entered into force 5 March 2018), online: https://treaties.un.org/doc/source/docs/UNEP_CBD_BS_COP_MOP_5_17-E.pdf.

¹⁹⁸ International Law Commission, Report of the International Law Commission on the work of its fifty-third session, Official Records A/56/10 (Geneva: International Law Commission, 2001), online: <http://legal.un.org/ilc/reports/>.

Draft Principles on the Allocation of Loss in the case of Transboundary Harm Arising out of Hazardous Activities (2006) also provides the “response measures” in the principle 5:

“(a) the State of origin shall promptly notify all States affected or likely to be affected of the incident and the possible effects of the transboundary damage; (b) the State of origin, with the appropriate involvement of the operator, shall ensure that appropriate response measures are taken and should, for this purpose, rely upon the best available scientific data and technology; (c) the State of origin, as appropriate, should also consult with and seek the cooperation of all States affected or likely to be affected to mitigate the effects of transboundary damage and if possible eliminate them; (d) the States affected or likely to be affected by the transboundary damage shall take all feasible measures to mitigate and if possible to eliminate the effects of such damage; (e) the States concerned should, where appropriate, seek the assistance of competent international organizations and other States on mutually acceptable terms and conditions.”¹⁹⁹

In the conventions and agreements, they provide the ways for dealing with the damage and they have mentioned the compensation and the response measures. Part 1 mainly discusses the definition of loss or damage in the cases, and this part mainly deals with the treatment of loss or damage in the cases. In the “Trail smelter case (United States, Canada)”, the tribunal made the decision “due to the operation of the Smelter, and disposition of claims for indemnity for damage has been made by the two Governments; but in no case shall the aforesaid compensation be payable in excess of the indemnity for damage.”²⁰⁰ In the “Case Concerning Pulp Mills on the River Uruguay (Argentina v. Uruguay), the International Court of Justice concluded that Uruguay had not violated its substantive obligations under the statute. However, in addition to this conclusion, the court stressed that, under the 1975 statute, the parties

¹⁹⁹ International Law Commission, Report of the International Law Commission on the work of its fifty-eighth session, Official Records A/61/10 (Geneva: International Law Commission, 2006), online: <http://legal.un.org/ilc/reports/>

²⁰⁰ Trail Smelter Arbitral Tribunal, 1941 *Trail smelter case (United States, Canada)*, *supra* note 149.

have a legal obligation to collaborate through CARU and enable it to design the necessary tools to promote equitable use while protecting the river environment.²⁰¹

The International Court of Justice made a very important judgment on compensation for environmental damage in certain activities carried out by Nicaragua in the border area (*Costa Rica v. Nicaragua*), and the Republic of Nicaragua compensated the Costa Rica.²⁰² And the total amount of compensation awarded to Costa Rica is US\$378,890.59 to be paid by Nicaragua by 2 April 2018. This amount includes the principal sum of US\$358,740.55 and pre-judgment interest on the compensable costs and expenses in the amount of US\$20,150.04. Should payment be delayed, post-judgment interest on the total amount will accrue as from 3 April 2018.²⁰³

Although this is a case where a State commits a wrongful act²⁰⁴ and then the State compensates the injured State, it is the first time that the International Court of Justice has made compensation for environmental damage. In the “Case Concerning Pulp Mills on the River Uruguay (*Argentina v. Uruguay*), the International Court of Justice did not ask Uruguay for compensation, but instead demanded that Uruguay take measures other than compensation, even if it was determined that Uruguay was in breach of its international obligations. In the “Trail smelter case (*United States, Canada*)”, the tribunal demanded that Canada pay compensation to the United States, but this compensation was not made for environmental damage. Although this case is

²⁰¹ see ICJ, 2010 *Case Concerning Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, *supra* note 150.

²⁰² ICJ, 02/02/2018 *Costa Rica v. Nicaragua*, *supra* note 124. The compensation has been discussed in the Part 1.

²⁰³ *Ibid.*

²⁰⁴ Nicaragua’s unlawful activities have be explained in the Part 1.

very famous in the development of international environmental law, the definition of damage has not risen to the level of discussion.

Methodology for the valuation of environmental damage that Costa Rica considers most appropriate, which it terms the “ecosystem services approach”.²⁰⁵ Costa Rica believes that its “ecosystem services approach” is the latest internationally recognized practice. Nicaragua considers its methodology to be the standard approach to natural resource damage assessment. In particular, it notes that this was one of the methodologies followed by the United Nations Compensation Commission when assessing claims for environmental damage.²⁰⁶ Nicaraguan believes that Costa Rica’s claim that this method has been replaced is unjustified. In fact, Nicaraguan also believes that its assessment method is an international practice.

This case discusses how to assess environmental damage, and the assessment method can be used as a reference for dealing with climate change loss and damage, even if we think that compensation is currently difficult to deal with the issues of loss and damage caused by climate change.

2.2 The fulfilment of adaptation obligations for Loss and Damage

The subject of international law is a topic of great controversy. “Rights and obligations must apply to someone; hence, it is through subjects’ doctrine that these

²⁰⁵ ICJ, 02/02/2018, No. 150, Costa Rica v Nicaragua (available on <https://www.icj-cij.org/en/case/150>) at 15.

²⁰⁶ *Ibid* at 16.

rights and obligations under international law are allocated.”²⁰⁷ “The main subjects of international law are states, and for centuries states were held to be the only subjects of international law, save perhaps for a few oddities which would be considered subjects for historic reasons and, it seems, because states generally treated them as subjects.”²⁰⁸ “States are the main subjects of international law and are generally considered to be sovereign, implying that they need not accept any authority from above or from anyone else unless they choose to do so. Importantly though, sovereignty is not a natural concept, but is, instead, socially constructed. Moreover, sovereignty itself does not signify very much; it does not, in and of itself, give rise to rights or obligations.”²⁰⁹ The elements of states often derived from a convention concluded in the 1930s. The Montevideo Convention considers States should have a population, territory, a government and the capacity to enter into relations with other states.²¹⁰ “Next to states, it is generally accepted that international organizations play a pivotal role in global affairs and, therewith, in international law. International organizations are usually defined as intergovernmental organizations, created by states, usually by means of a treaty, in order to exercise a task or function that states themselves are unable or unwilling to perform.”²¹¹

We have studied the subject of international law above. At the same time, the next important issue is the content of international law. At present, the international

²⁰⁷ Jan Klabbbers, *International law* (Cambridge, United Kingdom: Cambridge University Press, 2013).

²⁰⁸ *Ibid.*

²⁰⁹ *Ibid* at 69.

²¹⁰ See Montevideo Convention on the Rights and Duties of States, 26 December 1933, (entered into force 26 December 1934), online: <https://www.ilsa.org/Jessup/Jessup15/Montevideo%20Convention.pdf>.

²¹¹ Klabbbers, *supra* note 207.

community has reached consensus on the content of international law. The substance of international law includes: the law of armed conflict, international criminal law, the sea law, the air law, the outer space law, the environment law and the law on the global economy. International law stipulates rights and obligations for states and international organizations in various fields, as well as in the field of climate change. For states and international organizations, while enjoying rights, they should also consider how to fulfil international obligations more effectively.

2.2.1 The adaptation obligations for the Loss and Damage

Due to the long-term and irreversible consequences for human and natural ecosystems, this has become a problem requiring a global response. The impact of climate change has risen from environmental issues to major development issues, and strategies to address development and poverty reduction will increasingly be included. The international community ensures that strong action is taken to address climate change. Without the participation of developing countries, the struggle to adapt to their influence will fail. The United Nations Framework Convention on Climate Change (UNFCCC) establishes an overall framework for intergovernmental efforts to address the challenges posed by climate change. It encourages developed countries to stabilize greenhouse gas (GHG) emissions and urges developing countries to develop appropriate mitigation and adaptation action plans. Under the United Nations Framework Convention on Climate Change, adaptation has become increasingly important recently, but as a policy response, adaptation development is far less than

mitigation. But what is the “adaptation”? Does it mean “we should do nothing, just waiting for the consequences of climate change? In the report of IPCC, it considers that: “adaptation is the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.”²¹²

The Conference of the Parties, the highest body of the Convention, has made several decisions on adaptation over the years. These decisions involve support and funding from developed country Parties to assist developing countries in impact, vulnerability and adaptation assessments, capacity-building, training, education and public awareness, specific adaptation activities, technology transfer and exchange of experience through regional cooperation. In addition, it promotes the development of technologies that contribute to enhancing adaptation to climate change impacts. Climate adaptation policies refer to actions taken by international agencies and governments, including legislation, regulations and incentives to reduce vulnerability to climate change, including climate variability and extremes.

Before the Cancun Adaptation Framework, the Conference of Parties put forward some adaptation measures so that we can observe the development of the adaptation policies in UNFCCC.

²¹² See The core writing team, R K Pachauri, Leo Maye & Intergovernmental Panel on Climate Change, *Climate change 2014: synthesis report* (Geneva, Switzerland: Intergovernmental Panel on Climate Change, 2015) at 118, online: http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml.

The developments of adaptation policies in UNFCCC:

Year	COP	adaptation policies in UNFCCC
1995	COP 1	Regarding adaptation, the policies, programme priorities and eligibility criteria should apply adaptation to the adverse effects of climate change, as defined by the Convention, will require short, medium and long term strategies which should be cost effective, take into account important socio-economic implications, and should be implemented on a stage-by-stage basis in developing countries that are Parties to the Convention. ²¹³
1997	COP 3	To accelerate the development of methodologies for adaptation technologies, in particular decision-making tools to evaluate alternative adaptation strategies. ²¹⁴
1998	COP 4	Encourages all relevant international organizations to mobilize and facilitate efforts to provide financial resources needed by developing country Parties to meet their agreed incremental costs, including development and transfer of technologies, enhancement of endogenous capacities, and implementation of such measures as improving energy efficiency, exploiting renewable energies, enhancing sinks and preparing for adaptation to adverse effects of climate change. ²¹⁵

²¹³ *Report of the Conference of the Parties on its first session*, Official Records, Official Records FCCC/CP/1995/7/Add.1 (Berlin, 1995).

²¹⁴ Kyoto Protocol, December 1997, UNTS, (entered into force 16 February 2005), online: <https://unfccc.int/resource/docs/convkp/kpeng.pdf>.

²¹⁵ *Report of the Conference of the Parties on its fourth session*, Official Records, Official Records FCCC/CP/1998/16/Add.1 (BUENOS, 1998).

2001	COP 7	Establishment of NAPAs (National Adaptation Programmes of Action) for Least Developed Countries (LDCs); and of the Adaptation Fund (AF), under the Special Climate Change Fund (SCCF), to finance adaptation projects and programs in developing countries that are Parties to the Kyoto Protocol. ²¹⁶
2002	COP 8	Parties should promote informal exchange of information on actions relating to mitigation and adaptation to assist Parties to continue to develop effective and appropriate responses to climate change. ²¹⁷
2004	COP 10	Requests the Global Environment Facility to support the activities through efforts to address adaptation in the climate change focal area and to mainstream it into other focal areas of the Global Environment Facility. ²¹⁸
2007	COP 13	Financial and technical support for capacity-building in the assessment of the costs of adaptation in developing countries, in particular the most vulnerable ones, to aid in determining their financial needs. ²¹⁹
2009	COP 15	New multilateral funding for adaptation will be delivered through effective and efficient fund arrangements, with a governance structure providing for equal representation of developed and developing countries. A significant portion of such funding should flow through the Copenhagen

²¹⁶ "National Adaptation Programmes of Action | UNFCCC", online:

<<https://unfccc.int/topics/resilience/workstreams/national-adaptation-programmes-of-action/introduction>>.

²¹⁷ *The Ministers and other heads of delegation present at the eighth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change*, Official Records, Official Records (Delhi, 2002).

²¹⁸ *Report of the Conference of the Parties on its tenth session*, Official Records, Official Records FCCC/CP/2004/L.16 (Buenos Aires, 2004).

²¹⁹ *Report of the Conference of the Parties on its thirteenth session*, Official Records, Official Records FCCC/CP/2007/6/Add.1 (Bali, 2007).

		Green Climate Fund. ²²⁰
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2.2.2 The relationship between adaptation and mitigation

The adaptation policies proposed by the Conferences of the Parties have been listed above, which require parties to take action to meet their adaptation obligations. The mitigation obligation is inseparable from the adaptation obligation. In the process of fulfilling the adaptation obligation, how to coordinate the adaptation obligation and mitigation obligation is also an important issue to deal with the loss and damage of climate change. When it comes to mitigation obligations, we clearly remember that the Kyoto Protocol stipulates the emission reduction obligations of relevant countries, as well as three important mechanisms related to mitigation. The mechanisms of Kyoto Protocol are International Emissions Trading; Clean Development Mechanism (CDM); Joint implementation (JI). With the emergence of the Paris Agreement, these three mechanisms have gradually dropped out of our sight. The emission reduction obligations of the contracting Parties have gradually changed from mandatory emission reduction targets to independent emission reduction targets. In the future emission reduction actions, we believe that the spontaneous actions of the people, such as “International Cooperation Initiatives (ICIs)” and government led independent emission reduction actions, such as “National Determined Contribution (NDCS)” will occupy the main position in the implementation of mitigation obligations.

²²⁰ *Report of the Conference of the Parties on its Fifteenth session, Official Records, Official Records FCCC/CP/2009/L.7 (Copenhagen, 2009).*

“International cooperation initiatives (ICIs)”. The adverse effects of climate change have seriously hindered the sustainable development of some countries or regions. At the same time, climate change cannot be solved by one country or region. This means that we must act individually and collectively, especially effective measures to alleviate the adverse effects of climate change. One of the important aspects of dealing with the loss and damage caused by climate change is how to make use of atmospheric space and how to avoid more serious loss and damage caused by greenhouse gas emissions. This requires countries to strengthen cooperation and work together.

The Emissions Gap Report 2013²²¹ introduces the concept of the “International cooperation initiative” for the first time and classifies it as follows: “1. Global dialogues. These initiatives provide a forum for national governments to exchange information and understand national priorities. Some are primarily at the head-of-government level, such as the G8 and the G20; others at the ministerial level, such as the Major Economies Forum. Some include industry, academia, and/or civil society. These groups may issue statements of intent or voluntary commitments and otherwise contribute to consensus building. 2. Formal multilateral processes. A number of international organizations and formal international negotiation processes are addressing issues that are relevant to the reduction of greenhouse gas emissions. These include international treaties such as the Montreal Protocol on Substances that Deplete the Ozone Layer or sector specific

²²¹ From 2010 to 2019, UNEP has released the emissions gap report on global emissions every year. It is important report to track the emission reduction targets. It has compared where greenhouse gas emissions are heading against where they need to be, and highlighted the best ways to close the gap.

organizations such as the International Civil Aviation Organization or the International Maritime Organization. These international cooperative initiatives can produce binding international agreements to reduce emissions. 3. Implementation initiatives. There are many initiatives that focus on enabling countries to meet their pledges through sharing good practices and technical knowledge. Some concentrate on technical dialogues, including for instance the Mitigation and MRV Partnership, or the Clean Energy Ministerial. The more technical the discussion, the more non-governmental actors are often involved. Other initiatives go beyond dialogue to support sector-specific initiatives through the collective implementation and, in many cases, funding of programs or projects.”²²²

The Emissions Gap Report 2015 defines “International cooperative initiative” as: Initiatives outside the United Nations Framework Convention on Climate Change aims at reducing emissions of climate forcers by, for example, promoting actions that are less GHG intensive, compared to prevailing alternatives. Initiative also involve national and sub-national partners.²²³ The ICIs considered are grouped into three categories, cities and regions, companies and sectors.

Cities and regions: Subnational governments can act on climate change mitigation in many ways. Sub-national jurisdictions, such as state or regional governments, have even attempted to compensate for the lack of political will at the national level. There are many ICIs in which several cities and regions cooperate; for example, UNEP’s

²²² UNEP, the Emissions Gap Report 2013 (Nairobi, Kenya: United Nations Environment Programme, 2013) at 29.

²²³ UNEP, the Emissions Gap Report 2015 (Nairobi, Kenya: United Nations Environment Programme, 2015) at ix.

recent report on subnational actors lists twenty one initiatives of this type. A few started in the 1990s, while the majority started in the period 2005-2012 and some were announced during the UN Secretary-General's Climate Summit in September 2014.

Initiatives focus on the following roles:

“• Encouraging or facilitating emission reductions at the city and regional level, via knowledge sharing, capacity building and technical support for project planning and implementation

- Identifying partnerships and supporting local communities to become climate resilient
- Representing common city-level interests to influence policymakers at other levels
- Helping implement climate plans and low-carbon and climate-resilient economic development projects
- Achieving transparency and accountability by encouraging best practice in GHG emission reporting
- Helping overcome financial barriers and attract investors and accelerate additional capital flows into cities for low carbon projects.”²²⁴

Companies initiatives: “Another set of ICIs engage private sector companies in mitigation activities. A total of 30 such initiatives are currently listed on the Climate Initiatives Platform. Many of these initiatives act more as convening platforms for exchange of best practice and advocacy than engaging in direct commitments. But some have objectives that indirectly lead to emission reduction, for example, those aiming to re-direct investment to clean energy.”²²⁵ “Sector initiatives: Sector initiatives are grouped around renewable energy, energy efficiency, industrial processes, low carbon transport, land restoration and reforestation, and marine energy.”²²⁶

In terms of current forms of cooperation and participants, the role of “international

²²⁴ Ibid at 36, 37.

²²⁵ Ibid at 40.

²²⁶ Ibid at 42.

cooperation initiatives” is reflected in the following aspects: encouraging or promoting emission reductions at the urban and regional levels by providing knowledge sharing, capacity building and technical support for project planning and implementation; Identify partnerships and support local communities to adapt to climate change impacts; represent common levels of interest to influence policy makers at other levels; help implement climate plans and low carbon and climate adaptation economic development projects; and achieve transparency through encouraging best practices. In short, through various channels of cooperation, participants share knowledge and experience or develop mutual assistance to develop low-carbon projects to minimize greenhouse gas emissions. The diversity of the participants and the diversity of the cooperation methods reflect the recognition and attention of the international cooperation initiative, which proves that it is very feasible. The Emissions Gap Report 2013 and the Emissions Gap Report 2015 discussed above are slightly different on the definition of the International Cooperation Initiative. The 2013 Emissions Gap Report considers that the “International cooperation initiative” includes a global dialogue, a formal multilateral process, and an implementation plan, which in turn identifies it as a broad concept. The Emissions Gap Report 2015 defines the “International Cooperation Initiative” as an initiative outside the *United Nations Framework Convention on Climate Change* to reduce emissions of climate-driven factors. Therefore, this paper argues that the focus of the “International cooperation initiative” is action and isn’t dialogue. “International cooperation initiative” is a policy measure outside the *UNFCCC* to coordinate the actions of various international law entities to reduce greenhouse gas emissions. It is independent of the *UNFCCC* but it is linked to the *UNFCCC*, an international

cooperation initiative that promotes international practices for emissions reduction, promotes the formation of international agreements related to emissions reductions.

Governments almost all have their own emission reduction policies, but the effects of emission reductions vary widely and cannot be measured by uniform standards. In the context of climate change mitigation, the “International cooperation initiative” is considered to be actor-led rather than the collaborative efforts of *UNFCCC* Party leaders, even though many international cooperation initiatives are still being carried out through cooperation with governments, because the government is often the key to achieving its reductions. The “International cooperation initiative” has many shortcomings. For example, extensiveness leads to insufficient depth and overlap between members. A limited number of participants is one of the important factors to hinder the effectiveness. Most initiatives are voluntary commitments that cannot be monitored, reported, and verified. In practice, actors may over-fulfill their commitments or may not achieve their goals; the private sector is widely involved in various initiatives and the private sector has not been supervised on the issue of emission reduction action.

In addition, there are many global or regional cooperation initiatives. For example, “the Global Methane Initiative (GMI)²²⁷ is a voluntary multilateral cooperation

²²⁷ “The Global Methane Initiative (GMI) is an international public-private partnership focused on reducing barriers to the recovery and use of methane as a clean energy source. GMI’s 45 Partner Countries and more than 700 Project Network members exchange information and technical resources to advance methane mitigation in three key sectors: Oil and Gas, Biogas, and Coal Mines. Learn more about the GMI.” See <https://www.globalmethane.org/>.

initiative aimed at reducing global methane emissions and using methane as a valuable clean energy source. Methane is the second largest greenhouse gas after carbon dioxide, accounting for about 20% of global emissions. Although methane in the atmosphere exists for a relatively short time and emits less than carbon dioxide, its potential for global warming is 28-34 times greater than that of carbon dioxide, so it is necessary to reduce methane emissions. The Global Methane Initiative aims to promote national project development related to methane emission reduction by linking governments, the private sector, banks, universities and non-governmental organizations for assessment, capacity-building, partnership building and information sharing.”²²⁸ The African Renewable Energy Initiative (AREI)²²⁹ is a change owned and led by Africa. This initiative seeks to accelerate and expand Africa’s enormous potential for renewable energy use. Supporting the actions of African Heads of State and Government on climate change under the authority of the African Union. AREI is built on the background of sustainable development and climate change response. According to the principles of the *United Nations Framework Convention on Climate Change*, the development strategy from low carbon to zero carbon can be achieved through climate financing. It recognizes the importance of rapidly expanding access to energy to enhance happiness, achieve economic development goals and sustainable development goals.

“Nationally Determined Contribution (NDCs)”. Strengthening action to

²²⁸ See “Global Methane Initiative”, online: <<https://www.globalmethane.org>>.

²²⁹ AREI was created as an Africa-owned and Africa-led initiative, with a people-centred approach to expand renewable energy use on the continent. The initiative was officially launched by African Heads of State under the African Union on December 2015 at the United Nations Climate Change Conference (COP21) in Paris.

address climate change will help countries achieve their goals of improving health, protecting the environment, and achieving sustainable development in order to meet the urgent needs of the public. The environmental and economic benefits of strengthening climate change response are obvious in both developed and developing countries. The mechanisms under the Kyoto Protocol are International Emissions Trading; Clean Development Mechanism (CDM); Joint implementation (JI). “Emissions trading enables Annex I Parties to acquire Assigned amount units (AAUs) from other Annex I parties that are able to more easily reduce emissions. It enables parties to pursue cheaper opportunities to curb emissions or increase removals wherever those opportunities exist, in order to reduce the overall cost of mitigating climate change.”²³⁰ “The CDM is a mechanism by which Annex I parties can invest in emission reduction projects or afforestation or reforestation projects in developing countries and receive credit for the emission reductions or removals achieved. These projects contribute to sustainable development of the host country and generate emission allowances, called certified emission reductions (CERs) that can be used by the Annex I party in meeting its emission target.”²³¹ “Joint implementation is also a project-based mechanism. It allows Annex I parties to implement projects that reduce emissions, or increase removals using sinks, in other Annex I countries. Emission reduction units (ERUs) generated by such projects can then be used by investor Annex I Parties to help meet their emissions targets. To avoid double counting, a corresponding subtraction is made from the host Party’s assigned amount. The term ‘joint implementation’ is convenient shorthand for

²³⁰ Climate Change Secretariat, “Uniting on Climate A guide to the Climate Change Convention and the Kyoto Protocol” (2007) at 31, online: <https://unfccc.int/resource/docs/publications/unitingonclimate_eng.pdf>.

²³¹ *Ibid* at 29.

this mechanism, although it does not appear in the *Kyoto Protocol*.²³²

The Kyoto Protocol has divided the world into developed countries and developing countries: under the *UNFCCC*, the world is divided between Annex 1 (developed) and Non-Annex 1 (developing) countries.²³³ “It has been the most notable attempt to effectuate collective action and it served to, established emissions ceilings on 6 specified GHGs for 38 countries, with the 15 members of the European Union (EU) treated as a single unit, to be reached on average in the five-year accounting period 2008-2012.”²³⁴ “The three important mechanisms under the Kyoto Protocol require different countries to reduce the greenhouse gas emission by the international collective actions. The goals of the Kyoto Protocol were to begin to reduce the growth of global greenhouse gas emissions. But the United States signed, but never ratified, the treaty, and pulled out in 2001. Canada signed, ratified, and then pulled out of the treaty in 2012 when it became clear that it would not meet its agreed emissions targets. Australia only joined in 2007, and has not met its agreed targets.”²³⁵ Kyoto Protocol can only be judged as a failure so a new international action should be proposed.

The “Nationally Determined Contribution (NDCs)” proposed by most countries is a key step in the international community’s response to climate change at present and in the future. “Nationally Determined Contribution (NDCs)” are at the heart of the Paris

²³² *Ibid* at 31.

²³³ Andrew Holland, “After Kyoto: Building an Effective Global Regime to Address Climate Change” 16 *Whitehead J Dipl Intl Rel* 53 2014 at 54. See also Haifeng Deng & Chiyuan Chen, “Common and Symmetrical Responsibility in Climate Change: A Bridging Mechanism for Adaptation and Mitigation” (2016) 9 *J E Asia Intl* 99 at 101.

²³⁴ Schenck, *supra* note 35.

²³⁵ Andrew Holland, “After Kyoto: Building an Effective Global Regime to Address Climate Change” 16 *Whitehead J Dipl Intl Rel* 53 2014 at 53.

Agreement²³⁶. “In short, they represent the contribution of each Party towards meeting the objective of this Agreement. For example, NDCs should, in aggregate, set the world on a trajectory towards peaking of global emissions as soon as possible and rapid reductions thereafter towards a balance of emissions and removals. This is why, through their NDCs, each Party should specify, among other things, its plans to reduce its emissions.”²³⁷

“Before the Paris Agreement, governments agreed that they would initiate or intensify domestic preparations for their intended nationally determined contributions (INDCs) towards achieving the objective of the Convention. At the time, the intention was to avoid a situation in which the Paris Agreement would have been agreed with no specific actions and timeframes for all its Parties. As such, INDCs were intended to cover this gap by inviting countries to outline the climate efforts they would undertake in the context of the Paris Agreement. The word “intended” was meant to indicate that these contributions were “intentions” with a view to formalizing them once the Paris Agreement had been adopted.”²³⁸

“Nationally Determined Contribution (NDCs)” are the autonomous behaviors of the Parties. The legal basis for the Parties to set the mitigation targets is different, and the attributes of the mitigation targets are very different. For example, Canada has

²³⁶ In Article 4 of the Paris Agreement, it provides that “each Party shall prepare, communicate and maintain successive nationally determined contributions that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.”

²³⁷ “The United Nations Framework Convention on Climate Change handbook”, online: <<https://unfccc.int/resource/bigpicture/>>.

²³⁸ “The United Nations Framework Convention on Climate Change handbook”, online: <<https://unfccc.int/resource/bigpicture/>>.

adopted local legislation to address climate change issues. The federal government's *Canadian Environmental Protection Act, 1999*²³⁹ requires the authorities to regulate greenhouse gases and reduce emissions through policy measures. According to the *Clean Air Act*²⁴⁰, *Energy Policy Act*²⁴¹, *Energy Independence and Security Act*²⁴², Environmental Protection Agency of the United States introduces measures for power plants to reduce carbon emissions; develop standards to address methane emissions from landfills, oil and gas sectors volume; reduce emissions of high-hydrofluorocarbons through new alternative energy policy projects.²⁴³ "EU and its Member States act jointly. On the basis of the general political directions by the European Council, the European Commission submitted legislative proposals for the implementation of the 2030 climate and energy framework both in the emissions trading sector and in the non-traded sector, to the Council and the European Parliament in 2015-2016."²⁴⁴ "In some Member States, domestic legally-binding legislation has been already in place for the 2020 climate and energy package. The existing legislation for land use, land-use change and forestry is based on the existing accounting rules

²³⁹ *Canadian Environmental Protection Act, 1999*, online: <https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/publications/canadian-environmental-protection-act-1999.html>.

²⁴⁰ *Clean Air Act, 1990*, United States Code as Title 42, Chapter 85, online: <https://www.epa.gov/clean-air-act-overview/clean-air-act-text#what>.

²⁴¹ *Energy Policy Act, 1992*, online: https://www.congress.gov/bill/102nd-congress/house-bill/776?_cf_chl_jschl_tk__=ef8f1d28c36d17e513eb571390511ae2a59c3bef-1604053674-0-AabMYRNIxNXXAVTLcM2UFi9krqNlIp78DMSKNs0fgYiVLhHHrvINluwU991u_PdAiVZQa6eB391FWBpbjQc9_wDxSfcvy5ckRGoebvm5pq-duFMuWzY03Wii24kaf_JIBszavBMokNrL_6s1_C69ieNO3_QFdsITGGVaYAOCU8WOyGcncuc6K58UotID0wKLo3t5VYVkFrcaSEBEhdTAWldmgpNfn3HhjVt5ra0ko0msEAiR9HDqN6N6y5Au8TVCaXkKk3V0Xqf0L4lknZQI4y00ZEhgdnHLQ_Hj_WnRJ9FErCYwxi0IX920Ro_fLONu3w.

²⁴² *Energy Independence and Security Act, 2007*, online: <https://www.epa.gov/greeningepa/energy-independence-and-security-act-2007>.

²⁴³ *Intended Nationally Determined Contribution of the USA*, Official Records, Official Records (USA, 2015), online: <https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx>.

²⁴⁴ *Intended Nationally Determined Contribution of the EU and its Member States*, Official Records, Official Records (EU, 2015), online: <https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx>.

under the second commitment period of the Kyoto Protocol.”²⁴⁵

The United States and Canada tend to use mitigation targets as a national policy and implement relevant domestic laws; while the European Union tends to confirm the mitigation target through a special legislation. It is very effective to implement the emission reduction targets through legislation. If the emission reduction target is used as an administrative goal, it may alter with the change of the government ruling party or the change of national development priorities for a period of time. A number of domestic legislation and corresponding regulations can guarantee the implementation of emission reduction actions and the achievement of emission reduction targets. However, most countries currently do not adopt domestic special laws to confirm the emission reduction targets of the “Nationally Determined Contribution”.

The Paris Agreement will serve as a guide to global response to climate change after 2020. Nationally determined contributions (NDCs) are at the core of the Paris Agreement and the achievement of these long-term goals. NDCs reflect efforts of countries to reduce emissions and adapt to the climate change. The Paris Agreement (Article 4, paragraph 2) requires each Party to prepare, communicate and maintain successive nationally determined contributions (NDCs) that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions. The important achievement of the Paris Agreement is to break through the “Kyoto protocol” model, which has long been a small area of

²⁴⁵ *Ibid.*

emission control and has low enthusiasm for participation in the country, and is generally involved in emission reduction actions. The “Kyoto Protocol” has created a “top-bottom” model of the international carbon emissions trading market, but has become a relatively closed carbon emissions trading system because it does not fully respect the autonomy and equal participation of the parties. The lack of practice in the Kyoto Protocol mechanism has led to a dispute over the abolition of the carbon emissions trading market in the Paris Agreement. The “Nationally Determined Contributions (NDCs)” established by the Paris Agreement mark the shift from “forced” to “autonomous” in global climate governance. In order to guarantee effective mitigation and to take into account both autonomy and equal participation, the Paris Agreement established a “top-bottom” mechanism. The new market mechanism no longer imposes special restrictions on credit transactions and respects the voluntary nature of participation and application by parties.

In 2016, Conference of the Parties’ twenty-second session put forward the report about “adaptation component of the intended nationally determined contributions”. Although the INDCs ²⁴⁶are diverse and each has some unique features, information on the following featured in many adaptation components: “(a) National circumstances informing the adaptation component; (b) Long-term goals and/or visions guiding the adaptation component; (c) Impact and vulnerability assessments; (d) Legal and

²⁴⁶ In December 2015, Prior to reaching the Paris Agreement, developed and developing countries submitted their national post-2020 climate action commitments, known as “Intended Nationally Determined Contributions (INDCs)”. The word “intended” was used because countries were communicating proposed climate actions ahead of the Paris Agreement being finalized. However as countries formally join the Paris Agreement and look forward to implementation of these climate actions – the “intended” is dropped and an INDC is converted into a “Nationally Determined Contribution (NDC)”.

regulatory frameworks, strategies, programs and plans that provide the basis for, or have informed, adaptation actions; (e) Measures or actions planned or under implementation in specific areas and/or sectors; (f) Costs, losses and/or damage due to climate impacts; (g) Means of implementation; (h) Monitoring and evaluation of adaptation; (i) Synergies between mitigation and adaptation.”²⁴⁷ This document provides an overview of the adaptation components of the INDCs and it presents an emerging trend, which is to promote the synergy of mitigation and adaptation.

Loss and damage caused by climate change already exist, and it is important to reduce greenhouse gas emissions. However, it seems that reducing greenhouse gas emissions has little effect on existing loss and damage. Therefore, this thesis considers that adaptation measures are the first measure to deal with loss and damage caused by climate change. The “Nationally Determined Contributions (NDCs)” and “International Cooperation Initiatives (ICIs)” mentioned above aim to reduce greenhouse gas emissions. These efforts to reduce greenhouse gas emissions show that the overall plan to address climate change still considers reducing greenhouse gas emissions as one of the important measures, but when dealing with a specific issue, such as loss and damage, countries need to consider the relationship between mitigation and adaptation, try to maintain a balance between them. The general direction is that both are equally important, but specific issues need to consider their circumstances. Mitigation measures have been discussed above, and the international community’s discussion on adaptation measures has not been ignored. As can be seen from the existing Warsaw international

²⁴⁷ *Aggregate effect of the intended nationally determined contributions: an update*, Official Records, Official Records FCCC/CP/2016/2 (Marrakech, 2016) at 16.

mechanism, the international community believes that mitigation measures and adaptation measures are equally important, and countries need to deal with the dynamic balance between the two. The following will focus on adaptation measures under the Warsaw International Mechanism.

2.2.3 The existing tool for the adaptation obligations: Warsaw International Mechanism

Before the 19th Conference of the Parties, in 2012, the 18th Conference of the Parties put forward the approaches to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change to enhance adaptive capacity. “It highlighted the important and fundamental role of the Convention in addressing loss and damage associated with climate change impacts, especially in developing countries that are particularly vulnerable to the adverse effects of climate change, including by promoting leadership, collaboration and cooperation, at the national, regional and international levels and for a broad range of sectors and ecosystems, in order to enable coherent and synergistic approaches to address such loss and damage.”²⁴⁸ There are important linkages between extreme weather events and slow onset events, and the importance of building comprehensive climate risk management approaches.²⁴⁹ Before the formation of Warsaw international mechanism, the Conference of the Parties proposed to establish

²⁴⁸ *Report of the Conference of the Parties on its eighteenth session, Official Records, Official Records FCCC/CP/2012/8/Add.1 (Doha, 2012)* at 21.

²⁴⁹ *Ibid.*

an international mechanism to deal with the loss and damage caused by climate change in order to improve the adaptability. The Conference of the Parties still takes UNFCCC as the leading role and puts forward the importance of comprehensive risk management. The Warsaw International Mechanism does not set targets for reducing greenhouse gas emissions for each country. Its main goal is to take adaptation measures to deal with the loss and damage caused by climate change.

To sum up the measures proposed in the report of the 19th Conference of the Parties to achieve the objectives of Warsaw international mechanism, there are three main measures: comprehensive risk; share information and enhance support; migration programs.

2.2.3.1 Comprehensive risk

The discussion of the precautionary principle has never stopped. Although multilateral environmental treaties and various doctrines attempt to define it, the principle is still vague, and the content and nature of the precautionary principle still have considerable controversy. The precautionary principle evolved out of the German socio-legal tradition. A prominent example is principle 15 of the 1992 Rio Declaration adopted at the United Nations Conference on Environment and Development, which also explains the basic concept of “precaution”: “in order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious irreversible damage, lack of full

scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental damage.”²⁵⁰

The *UNFCCC* provides the “precautionary measures”. In Article 3, it provides that:

“The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties.”

*Convention on Biological Diversity*²⁵¹ mentions the lack of “full scientific certainty.” It provides that:

“Where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat.”

In Article 5.7 of *Agreement on the Application of Sanitary and Phytosanitary Measures*²⁵² provides that:

“In cases where relevant scientific evidence is insufficient, a Member may provisionally adopt sanitary or phytosanitary measures on the basis of available pertinent information, including that from the relevant international organizations as well as from sanitary or phytosanitary measures applied by other Members. In such circumstances, Members shall seek to obtain the additional information necessary for a more objective assessment of risk and review the sanitary or phytosanitary measure accordingly within a reasonable period of time.”

²⁵⁰ Von Seht, Hauke & Ott, Hermann E, “EU Environmental Principles: Implementation in Germany” (2011) NO. 105 Wupp Pap, online: <<https://nbn-resolving.org/urn:nbn:de:bsz:wup4-opus-10776>>.

²⁵¹ See Convention on Biological Diversity, 5 June 1992, 8 UNTS 214, (entered into force 29 December 1993), online: <https://www.cbd.int/doc/legal/cbd-en.pdf>.

²⁵² See Agreement on the Application of Sanitary and Phytosanitary Measures, 15 April 1994, (entered into force on 1 January 1995), online: https://www.wto.org/english/docs_e/legal_e/15-sps.pdf.

Article 1 of *Cartagena Protocol on Biosafety to the Convention on Biological Diversity*²⁵³ provides that:

“In accordance with the precautionary approach contained in Principle 15 of the Rio Declaration on Environment and Development, the objective of this Protocol is to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing on transboundary movements.”

The concept of uncertainty is essential to the issue of the precautionary principle. Uncertain risks are used to denote risks for which the causal link between the activity and the hazard is unknown. Certain risks are risks for which the causal link is established. It is generally understood that the precautionary principle allows for the regulation of uncertain risks.²⁵⁴ When assessing whether there is a threat to public health and the environment in the future, the precautionary principle requires decision makers to consider the issue of “scientific uncertainty”.²⁵⁵ The legal applicable elements of the precautionary principle: 1. Uncertainty; 2. Determination of the threshold; 3. Balance of interests; 4. Adoption of appropriate preventive measures.²⁵⁶ The most important distinction between precaution and prevention would be that prevention is concerned with the prevention of relatively certain risks and precaution, on the other hand, is concerned with the prevention of relatively uncertain risks. The important change that follows the precautionary concept in policy and decision-making

²⁵³ See Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 29 January 2000, (entered into force on 11 September 2003), online: <https://www.cbd.int/doc/legal/cartagena-protocol-en.pdf>.

²⁵⁴ Joakim Zander, *the Application of the Precautionary Principle in Practice: Comparative Dimensions* (Leiden: Cambridge University Press, 2010).

²⁵⁵ Jacqueline Peel, *The precautionary principle in practice: environmental decision-making and scientific uncertainty*, Australian legal monographs (Annandale, N.S.W.: Federation Press, 2005).

²⁵⁶ Zhongmei Lv, *Introduction to Environmental Law* (Beijing: Peking University Press, 2015) at 52, 53, 54.

is that they should not be based on the assumed certainty of environmental knowledge, but on the certainty of the uncertainty of environmental knowledge. In other words, the regulation should to a greater degree be based on the management of uncertainty, and risk assessments should explicitly present and discuss related uncertainty.²⁵⁷ The division of uncertainty risk and certainty risk does not seem to be practical, because the risks are uncertain, and the purpose of taking precautionary measures is to prevent the occurrence of damage, whether or not there is sufficient scientific evidence to prove that damage will occur in the future. Precautions are taken against damage that has not yet occurred, and damage that has not occurred means that it may or may not occur. The precautionary principle applies to different areas and is used to control and manage risks that may affect health and the environment, food safety and other areas. Because each field has different requirements for the scientific rationality of precautionary measures, the preconditions for taking precautionary measures are also different. Threshold is a critical value for applying the precautionary principle. Its role is mainly to solve the problem of application basis and also to prevent the abuse of the precautionary principle.

“Risks of global aggregate impacts are moderate under additional warming of between 1°C and 2°C, reflecting impacts on both the Earth’s biodiversity and the overall global economy. Extensive biodiversity loss, with associated loss of ecosystem goods and services, leads to high risks at around 3°C additional warming. Aggregate economic

²⁵⁷ Hans Sanderson & Soren Petersen, “Power analysis as a reflexive scientific tool for interpretation and implementation of the precautionary principle in the European Union” (2002) 9:4 *Environ Sci Pollut Res* 221 at 224, online: <<http://link.springer.com/10.1007/BF02987494>>.

damages accelerate with increasing temperature, but few quantitative estimates are available for additional warming of above 3°C.”²⁵⁸ Overall economic loss have increased, but there is still no quantitative prediction for temperatures rising above 3 °C. Global warming must be controlled below the 2°C to reduce global risks. In the 2014 assessment report, IPCC distinguished the impacts of temperature rise of 1 ° C, 2 ° C and 3 ° C on human beings. Its ultimate purpose is to enhance human awareness of reducing greenhouse gas emissions. From the perspective of reducing greenhouse gases, human beings can fundamentally prevent the adverse effects of climate change. But the comprehensive risk management proposed here is linked with the early warning system, which is the prevention of impending loss and damage, and it needs more specific prevention obligations for the states than reducing greenhouse gas emissions.

2.2.3.2 Share information and enhance support

Climate involves more complex and potentially confounding variables than most environmental issues, and the localized modeling needed to aid adaptation decisions is especially difficult. However, deficiencies in knowledge are certainly not only limited to the effects of climate change; there also is substantial uncertainty regarding the efficacy of potential adaptation strategies. This lack of information is attributable in part to the fact that information about the performance of adopted resource management strategies is rarely, if ever, systematically generated. It is also partly due to insufficient avenues for sharing sources of information and coordinating action between potentially

²⁵⁸ The core writing team, R K Pachauri, Leo Mayer & Intergovernmental Panel on Climate Change, Climate change 2014: synthesis report (Geneva, Switzerland: Intergovernmental Panel on Climate Change, 2015) at 72. 127

interested parties.²⁵⁹ Establishing a stable information sharing mechanism among stakeholders is a measure proposed by the Warsaw International Mechanism to solve the problem of loss and damage. International conventions and their institutions can't foster to form a good adaptation measure for climate change, as they are not designed to reduce the uncertainty of regulators and the public and to promote learning. This thesis proposes to establish a revised regulatory infrastructure that requires and promotes systematic monitoring, assessment and adjustment of management decisions, and also establishes an interactive information-sharing network.

The information sharing mechanism needs to establish regulatory infrastructure, and also establishes an interactive information sharing network. From a macro perspective, it needs to establish an interactive mechanism to handle the relationship between countries. On a micro level, it also needs to establish a regulatory infrastructure to coordinate the relationships between state agencies within the country. Information sharing here is different from the prior notice obligation. "When developing and utilizing transboundary or shared water resources, all countries should make fair and reasonable use and do not cause significant harm. This is the most basic principle. When using water resources within their own territory or under their jurisdiction, they should take into account the interests of other coastal countries, so as to ensure that the development and utilization activities will not cause significant damage to the environment of other countries. Therefore, in the utilization of transboundary water

²⁵⁹ Alejandro E Camacho, "A Learning Collaboratory: Improving Federal Climate Change Adaptation Planning" (2011) 2011 BYU Rev 1821 at 1824.

resources, the state taking measures has the obligation of prior notice.”²⁶⁰ The information sharing and strengthening support here are the international obligations that all the capable contracting parties must fulfill on the premise of international cooperation, and the “prior notice obligation” is the obligation of specific countries to the countries that may be harmed. The obligation of information sharing and strengthening support is a substantive obligation stipulated by Warsaw international mechanism and Paris Agreement, but the prior notice obligation is procedural.

2.2.3.3 Immigration programs

The concept of environmental refugees has now been in circulation for more than twenty years. While the precise definition of environmental refugee varies from commentator to commentator, there are characteristics common to all interpretations. “During the late 1980s three categories of environmental refugees were identified that formed the basis of subsequent discussion on the topic. The first category includes those people temporarily displaced due to temporary environmental stress but who return to their habitat once the area has been rehabilitated, such as following a natural hazard or environmental accident. Second, environmental refugees might include those permanently displaced who have resettled elsewhere due to permanent environmental change that, in many cases, is often man-made, such as large dam projects. The third category of environmental refugees includes people who have migrated (either

²⁶⁰ Li Na, “The significance of the judgment in the Uruguayan River pulp mill case in environmental law” (2013) 3 Law79 at 80. See also PN Okowa, “Procedural Obligations in International Environmental Agreements” (1996) Br Yearb Int Law 275.

temporarily or permanently) in search of a better quality of life as a result of progressive degradation of environmental resources.”²⁶¹ For small island states and the least developed countries, the Loss and Damage caused by climate change are permanent and irreversible. Due to permanent environmental change, people in these countries face permanent displacement.

The UN Refugee Agency (UNHCR) has recognized the increasing number of people displaced by environmental change and the continuing international debate regarding the extension of the Refugee Convention to include environmental refugees. However, although the UNHCR has for a number of years demonstrated some limited involvement in environmental issues, it maintains there are significant and fundamental differences between traditional refugees accorded status under the Refugee Convention and those now more commonly referred to as environmental refugees.²⁶² The concept of environmental refugees is not established in international law. “There are three critical legal issues remain unaddressed: Firstly, the legal status and level of assistance and protection will depend on the character of the movement, requiring the development of criteria to better distinguish between forced and voluntary movements of persons. One could ask whether those moving voluntarily and those being forcibly displaced across borders should be treated differently not only as regards assistance and protection while away from their homes, but also as regards their possibility to be

²⁶¹ Angela Williams, “Turning the Tide: Recognizing Climate Change Refugees in International Law” (2008) 30:4 Law Policy 502 at 506.

²⁶² Angela Williams, “Turning the Tide: Recognizing Climate Change Refugees in International Law” (2008) 30:4 Law Policy 502 at 509. See also Calvin Bryne, “Climate Change and Human Migration” (2018) 8 UC Irvine Rev 761 at 781, 782.

admitted to other countries and remain there at least temporarily. Secondly, the right to be admitted and to stay on foreign territory is not guaranteed for those migrating or being displaced in the context of climate change, with the exception of those who qualify as refugees. The only exception is the prohibition - derived from the human rights prohibition of inhuman treatment - of forcible return of people to a country where they would be exposed to serious risks to life and health. Thirdly, the legal situation and the rights of persons on a foreign territory are only addressed through human rights law, but the specific needs of those migrating as a measure of adaptation or being displaced across borders are not taken into account. A set of status rights for such persons is missing in international law and their legal position will also depend on the characterization of their movement as voluntary or forced.”²⁶³ In general, the questions can therefore be summarized as follows: 1) How does forced migration in the context of climate change fit with the history and practice of refugee protection? 2) What legal problems flow from such recognition? 3) How might these problems be resolved in an international/regional context? ²⁶⁴

In my opinion, the term “environmental refugees” or “climate change refugees” often appears in the media and in the literature, referring to people who have been forced to leave their homes and cross national borders due to increased frequency of adverse weather events or increased risk of widespread climate change. But the term has no basis in international law, so I believe that we should not abuse them. In the

²⁶³ Walter Kälin & Nina Schrepfer, *Protecting People Crossing Borders in the Context of Climate Change Normative Gaps and Possible Approaches*, PPLA/2012/01 (2012) at 43.

²⁶⁴ Benedict Blunnie, “Climate Change and Forced Displacement: Conceptual and Legal Issues” (2014) 4 Kings Inns Stud Rev 87 at 88.

future, the international conventions should separate the “Displacement”, “Migration”, and the “Planned relocation”. In the report of “Human Mobility in the Context of Climate Change”, it says that “Climate change is a driver of human mobility and is expected to increase the displacement of populations. COP20 in Lima is an opportune moment for policy makers to ensure that adaptation measures are taken to prevent and mitigate displacement in the context of climate change, including through migration as an adaptation strategy and planned relocation as an adaptation measure of last resort.”²⁶⁵ In the report, the “Human Mobility” includes “Displacement”, “Migration”, and “Planned relocation”. “Displacement ” is situations where people are forced to leave their homes or places of habitual residence”, “Migration is movements that are predominantly voluntary”, and the “Planned relocation is an organized relocation, ordinarily instigated, supervised and carried out by the state with the consent or upon the request of the community.”²⁶⁶

After the formation of the Warsaw International Mechanism, the Conference of the Parties in 2014 negotiated the composition of the Executive Committee of the Warsaw International Mechanism for loss and damage associated with climate change impacts. Small Island developing States (SIDS) and least developed country (LDC) parties are involved to give full respect and voice to those countries that are vulnerable to climate change. The 20th Conference of the Parties decides that Executive Committee of the Warsaw International Mechanism for Loss and Damage associated

²⁶⁵ *Human Mobility in the Context of Climate Change* (Lima: The Advisory Group on Climate Change and Human Mobility COP 20, 2014) at 3.

²⁶⁶ *Ibid.*

with Climate Change Impacts shall be composed of the following: “(a) Ten members from Parties included in Annex I to the Convention (Annex I Parties); (b) Ten members from Parties not included in Annex I to the Convention (non-Annex I Parties), comprising two members each from the African, Asia-Pacific, and the Latin American and Caribbean States, one member from small island developing States, one member from least developed country Parties, and two additional members from non-Annex I Parties.”²⁶⁷

It can be seen that before the 22nd Conference of the Parties, the focus of discussion at the Conference of the Parties was on risk management and information exchange and the composition of the Executive Committee. After the 22nd Conference of the Parties, immigration plan and human rights protection gradually became the focus of the conference. “The 22nd Conference of the Parties encourages Parties to incorporate or continue to incorporate the consideration of extreme events and slow onset events, non-economic losses, displacement, migration and human mobility, and comprehensive risk management into relevant planning and action, as appropriate, and to encourage bilateral and multilateral entities to support such efforts.”²⁶⁸ “Parties have urgent need to avert, minimize and address these impacts through comprehensive risk management approaches, inter alia, through early warning systems, measures to enhance recovery and rehabilitation and build back and forward better, social protection

²⁶⁷ *Report of the Conference of the Parties on its twentieth session*, Official Records, Official Records FCCC/CP/2014/10/Add.2 (Lima, 2014) at 2.

²⁶⁸ *Report of the Conference of the Parties on its twenty-second session*, FCCC/CP/2016/10/Add.1 (Marrakech, 2016) at 9.

instruments, including social safety nets, and transformational approaches.”²⁶⁹

The 24th Conference of the Parties invites Parties: “(a) to consider developing policies, plans and strategies, as appropriate, and to facilitate coordinated action and the monitoring of progress, where applicable, in their efforts to avert, minimize and address loss and damage; (b) to take into consideration future climate risks when developing and implementing their relevant national plans and strategies that seek to avert, minimize and address loss and damage and reduce disaster risks, as appropriate.”²⁷⁰ “In the Annex, the report of the 24th Conference of the Parties proposed recommendations on integrated approaches to averting, minimizing and addressing displacement related to the adverse impacts of climate change. Conference of the Parties invites Parties to consider formulating laws, policies and strategies, as appropriate, that reflect the importance of integrated approaches to avert, minimize and address displacement related to the adverse impacts of climate change and in the broader context of human mobility, taking into consideration their respective human rights obligations and, as appropriate, other relevant international standards and legal considerations.”²⁷¹

After three discussions in the Conference of the Parties, the 25th Conference of the Parties has put forward new requirements for the Warsaw International Mechanism. To deal with the loss and damage caused by climate change, the parties should not only

²⁶⁹ *Report of the Conference of the Parties on its twenty-third session*, Official Records, by United Nations, Official Records FCCC/CP/2017/11/Add.1 (Bonn: UN, 2017) at 20.

²⁷⁰ *Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on the third part of its first session*, Official Records, by Conference of the Parties, Official Records FCCC/PA/CMA/2018/3/Add.2 (Katowice, 2018) at 41.

²⁷¹ *Ibid* at 43.

consider increasing the ability of risk management but also protect the intellectual property and human rights of indigenous people. “The 25th Conference of the Parties reaffirms the importance of the Warsaw International Mechanism for averting, minimizing and addressing loss and damage in developing countries that are particularly vulnerable to the adverse effects of climate change. It recognizes the importance and value of indigenous, traditional and local knowledge.”²⁷²

As for the current development of Warsaw International Mechanism, at the request of the Conference of the Parties, this international mechanism has always emphasized the role of risk management and assessment, and has paid more and more attention to immigration plans. After the formation of the Paris Agreement, the 25th Conference of the Parties proposed “parties should, when taking action to address climate change, respect, promote and consider their prospective obligations on human rights, the right to health, the rights of indigenous people, local communities, migrations, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity.” In fact, the response to climate change loss and damage has changed from the situation dominated by UNFCCC to the situation dominated by the Paris Agreement.

Under the guidance of the Paris Agreement, this thesis puts forward the following suggestions:

- a) Make a special definition. At present, it is the most difficult problem to solve

²⁷² *Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on its second session, FCCC/PA/CMA/2019/6/Add.1 (Madrid, 2019) at 5.*

the migration problem caused by climate change that the definition of climate migration is not clear. Currently there is no unified definition in legal terms as to a person displaced by climate change. The *African Union Convention on Internally Displaced Persons Kampala Convention* is the only international instrument aimed at a regional response that is the closest to recognizing people displaced by climate change wherein it defines “internally displaced persons” as: Persons or groups of 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 international recognized State border.²⁷³

However, *the Convention relating to the Status of Refugee*²⁷⁴ and *Protocol relating to the Status of Refugees*²⁷⁵ stipulate that “refugees” are formed because of race, religion, nationality, members of special social groups or political opinions. The definition of climate refugees should be depoliticized, and the specific situation of the “human mobility” includes “displacement”, “migration”, and “planned relocation”. A special definition should be set up in the international legislation to deal with climate change, and a special definition should be made according to the specific situation.

b) Special bilateral and multilateral conventions should be formulated. While the

²⁷³ Kampala Convention, 23rd October 2009, (entered into force 6th December 2012, online: https://au.int/sites/default/files/treaties/36846-treaty-kampala_convention.pdf).

²⁷⁴ Convention relating to the Status of Refugees, 28 July 1951, (entered into force 22 April 1954), online: <https://www.unhcr.org/3b66c2aa10>.

²⁷⁵ Protocol relating to the Status of Refugees, 31 January 1967, (entered into force 4 October 1967), online: <https://www.unhcr.org/3b66c2aa10>.

inadequacy of the protection of climate change migrants under the Refugee Convention has been displayed in the earlier section, a multi-national treaty can be envisaged for addressing climate change migration. A new multilateral treaty could be specifically tailored to climate change migrants and avoid conflict with the existing refugee community. While this is a possible solution, it is riddled with many problems.²⁷⁶ As the definition of climate refugees has not yet been unified, countries have different views on how to deal with climate refugees, so it seems difficult to form a unified treatment measures. The countries concerned can reach bilateral or multilateral treaties to deal with this issue according to the specific conditions of the two or more parties, and can also realize the development of international law in this field.

c) Set up special provisions. In view of the fact that the migration problem caused by climate change has become an unavoidable human rights crisis challenge for the international community, special provisions need to be set up in the new UN climate change convention to deal with the crisis. Since the immigration problem caused by climate change is a part of the measures to deal with climate change, it is suggested that this clause should be included in the future climate change convention, and it should be combined with other provisions to solve the problem. There are many problems involved in climate change migration. One of the fundamental problems is the funding for resettlement of refugees. Obviously, international assistance needs to be emphasized once again.

²⁷⁶ Akanksha Jumde & Nishan Kumar, "Climate Change Induced Migration: Challenges and Opportunities under International Law" (2018) Vol.4 Environ Law Soc J 1 at 11.

d) Domestic migration and international migration coexist. Existing efforts to support communities experiencing forced migration at the hands of climate change are numerous, reflecting the complex nature of both climate change and human movement. Those responses include: (1) international legal frameworks focused on environmental impacts; (2) international legal frameworks focused on immigration; (3) domestic legal actions; and (4) imposition of liability on responsible parties.²⁷⁷

Under the framework of international human rights law, the state not only has the obligation to ensure that the state's behavior does not violate human rights, but also has the responsibility to protect the human rights of its citizens from being affected, that is, the obligation to protect human rights. Although the necessity and importance of state responsibility related to climate change has been widely concerned, the discussion on human rights protection in the process of coping with climate change is still relatively general, and there is no clear description of the specific content of state responsibility. The international community may not have reached an agreement on international migration, but internal migration belongs to the internal affairs of a country. It is an obligation of the state to protect the rights of those displaced by climate change.

There are more and more discussions on climate refugees in the international community, and the conference of the parties to climate change and the Warsaw international mechanism are paying more and more attention to immigration plans. The significant impact of climate change on human rights has been mentioned in Part I,

²⁷⁷ Calvin Bryne, "Climate Change and Human Migration" (2018) 8 UC Irvine Rev 761 at 773.

consequences of climate change. Therefore, in order to solve the problem of population migration caused by climate change, the international community should link this issue with international human rights law. At present, the international climate change legal system has not really been established, and the framework has problems of weak implementation. The current international climate change law system can't effectively deal with the global climate change crisis and the human rights challenges caused by climate change are less involved in the system. In the future, international human rights law should be introduced to protect migration caused by climate change.

The implementation of international human rights law of the international Convention on Human Rights stipulates that the system of national communications and individual communications has special features. The system of reconciliation of official documents sent or mailed by states is an important system by which States Parties utilize relevant international institutions to supervise other States Parties in fulfilling their obligations under international human rights conventions. In this regard, The Provisions of the *International Convention on Civil and Political Rights*²⁷⁸ are more representative. In accordance with articles 41 and 42 of the International Covenant on Civil and Political Rights, States parties may make declarations at any time. At the same time, it was recognized that the Human Rights Committee could receive and consider documents sent or mailed from a state party that regionally accused another State Party of non-compliance with its obligations under the Convention.²⁷⁹ Some

²⁷⁸ International Covenant on Civil and Political Rights, 16 December 1966, (entered into force 23 March 1976), online: <https://www.ohchr.org/en/professionalinterest/pages/ccpr.aspx>.

²⁷⁹ Chengyuan Ma, *International Law* (Beijing: Renmin University Press, 2019) at 200.

international human rights treaties also have provisions on the individual communication system. For example, *Optional Protocol to the International Convention on Civil and Political Rights*²⁸⁰ provides, “A State Party to the Covenant that becomes a Party to the present Protocol recognizes the competence of the Committee to receive and consider communications from individuals subject to its jurisdiction who claim to be victims of a violation by that State Party of any of the rights set forth in the Covenant. No communication shall be received by the Committee if it concerns a State Party to the Covenant which is not a Party to the present Protocol.” “Individuals who claim that any of their rights enumerated in the Covenant have been violated and who have exhausted all available domestic remedies may submit a written communication to the Committee for consideration.” The international human rights conventions not only stipulate the obligations of the state, but also stipulate two special supervision systems. These become the differences between the international human rights conventions and other conventions, and can be used as the development direction of other international conventions.

Another system is the reporting system. With regard to the major international conventions on human rights, it generally provides for States Parties to submit reports to the relevant bodies within the time and procedures set forth in the conventions, which can indicate what measures have been taken, what progress has been made and what specific difficulties exist in the implementation of the conventions. Such reports should be considered by the relevant human rights bodies, which may also make non-legally

²⁸⁰ *Optional Protocol to the International Covenant on Civil and Political Rights*, 1966, 999 UNTS 302, (entered into force March 23, 1976), online: <http://hrlibrary.umn.edu/instatee/b4ccprp1.htm>.

binding comments or recommendations on their contents. In accordance with article 40 of the *International Convention on Civil and Political Rights*, the need for the submission and hearing of national reports is the only mandatory regime in the monitoring procedures established by the Covenant. While States had no choice, as long as they were Parties to the *International Convention on Civil and Political Rights*, they were obliged to submit reports and had the power to check them before the Human Rights Committee.²⁸¹

The mechanism of international human rights law mainly depends on sovereign states to protect the human rights of their nationals, which makes them not to be infringed. Therefore, the human rights related to climate change requires the states parties to the human rights convention to assume responsibilities related to human rights, which can deal with climate change. While there is no international consensus on whether climate change violates human rights law, this does not preclude the obligation of States Parties to the convention on human rights to assume responsibilities related to climate change, which can keep human rights in the country from the negative effects of climate change.

2.3 Implementation and Compliance Mechanism

Ensuring compliance by members of the international community with their international environmental obligations continues to be a matter of serious concern.

²⁸¹ See Chengyuan Ma, *International Law* (Beijing: Renmin University Press, 2019) at 196.

States implement their international environmental obligations in three distinct phases. “First, by adopting national implementing measures; second, by ensuring that national measures are complied with by those subject to their jurisdiction and control; and, third, by fulfilling obligations to the relevant international organizations, such as reporting the measures taken to give effect to international obligations.”²⁸²

First, a State usually assumes international obligations after the entry into force of its ratified treaties or the actions of international organizations bound by them. Therefore, it is usually necessary to enact, adopt or amend relevant national laws, or adopt administrative or other measures to influence national policies, plans or strategies. Some treaties²⁸³ explicitly require parties to take measures to ensure compliance with their obligations or to take appropriate measures within their competence to ensure compliance with the convention and any measures to enter into force under the convention. Some countries do amend the existing domestic laws or enact new special laws according to the provisions of international conventions in order to fulfill their international obligations. For instance, in China, since the promulgation of the first Criminal Law²⁸⁴ in 1979, the Standing Committee of the National People’s Congress has paid attention to the international conventions China has acceded to. From 1981 to 1995, nearly half of the 24 special criminal laws passed by the Standing Committee of the National People’s Congress confirmed the relevant provisions of the international

²⁸² Philippe Sands, *Principles of international environmental law*, 3rd ed. (Cambridge ; New York: Cambridge University Press, 2012) at135, 138.

²⁸³ 1969 Southeast Atlantic Convention; 1972 London Convention and 1996 Protocol.

²⁸⁴ Its function is equivalent to the Criminal Law Code in China. See http://www.law-lib.com/law/law_view.asp?id=327.

conventions on criminal law to which China is a party.²⁸⁵ Therefore, amending the domestic law and adopting the relevant provisions of international conventions is one of the methods for some countries to comply with and implement the international conventions.

Second, once an obligation is fulfilled domestically, states parties must ensure that persons or organizations within their jurisdiction and control comply with international obligations. Many treaties explicitly require states to ensure compliance with these provisions or to apply for sanctions for non-compliance. Recognizing that there may be inadequacies in relying solely on states to fulfil their international obligations, it may not be possible to fully ensure the fulfilment of international obligations, because there may be inadequate resources or conditions for their fulfilment, and that individuals, groups and enterprises can play a role in ensuring compliance with and compliance with conventions, more and more countries are encouraging private implementation of national environmental obligations. For example, in the *Aarhus Convention*, Article 9²⁸⁶ stipulates the provisions for the public to supervise the state to perform its obligations.

Third, an important element of national compliance is the requirement that states

²⁸⁵ For example, in 1981, the Provisional Regulations for the punishment of military offense against duty shall be added to the war crimes. In 1990, the Decision of the Standing Committee of the National People's Congress on Drug Control supplemented the confirmation of drug crimes.

²⁸⁶ Each Party shall, within the framework of its national legislation, ensure that members of the public concerned (a) having a sufficient interest or, alternatively, (b) maintaining impairment of a right, where the administrative procedural law of a Party requires this as a precondition, have access to a review procedure before a court of law and/or another independent and impartial body established by law, to challenge the substantive and procedural legality of any decision, act or omission subject to the provisions of article 6 and, where so provided for under national law and without prejudice to paragraph 3 below, of other relevant provisions of this Convention. See *Aarhus Convention*, June 1998, (entered into force October 2001), online: <https://www.unece.org/fileadmin/DAM/env/pp/documents/cep43e.pdf>.

usually have to report on national implementation measures. Many environmental agreements require parties to report certain information to the international organization designated by the agreements. For example, the Montreal Protocol provides the “reporting data” in the Article 7²⁸⁷. The *Kyoto Protocol* provides that each Party shall submit information about the emissions to the Conference of the Parties in the Article 7²⁸⁸. The article VIII of *International Whaling Convention* provides that each Contracting Government shall, so far as practicable and at intervals of not more than one year, transmit to the bodies designated by the Committee scientific information on whales and whaling as is available to the government.²⁸⁹ The State reports data, emission information and scientific information available to the designated body (e.g. the Secretariat) on controlled substances produced, imported and exported by the Government. Some information may be reported to other parties, as appropriate. In some cases, States should also indicate the legislative and administrative provisions they have adopted and other actions taken for the Convention, as well as the experience gained in this field. In a word, the information to be reported includes: statistical information on production, imports and exports; information on emissions or discharges;

²⁸⁷ the Montreal Protocol provides the “reporting data” in the article 7: “Each Party shall provide to the secretariat, within three months of becoming a Party, statistical data on its production, imports and exports of each of the controlled substances for the year 1986, or the best possible estimates of such data where actual data are not available. Each Party shall provide statistical data to the secretariat on its annual production (with separate data on amounts destroyed by technologies to be approved by the Parties), imports, and exports to Parties and non-Parties, respectively, of such substances for the year during which it becomes a Party and for each year thereafter. It shall forward the data no later than nine months after the end of the year to which the data relate.” See Montreal Protocol, September 1987, (entered into force January 1989), online: <https://treaties.un.org/doc/publication/unts/volume%201522/volume-1522-i-26369-english.pdf>.

²⁸⁸ The reporting information about the emissions: “Each Party included in Annex I shall incorporate in its annual inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol, submitted in accordance with the relevant decisions of the Conference of the Parties, the necessary supplementary information for the purposes of ensuring compliance with Article 3, to be determined in accordance with paragraph 4 below. See Kyoto Protocol, December 1997, UNTS, (entered into force 16 February 2005), online: <https://unfccc.int/resource/docs/convkp/kpeng.pdf>.

²⁸⁹ International Whaling Convention, 2 December 1946, (entered into force on 10 November 1948), online: <http://library.arcticportal.org/1863/1/1946%20IC%20for%20the%20Regulation%20of%20Whaling-pdf.pdf>.

information on the grant of permits or authorizations, including the criteria therefor; information on implementation measures which have been adopted; details of decisions taken by national authorities; scientific information; and information on breaches or violations by persons under the jurisdiction or control of the party.²⁹⁰

Three approaches to implementation are discussed above. Especially with regard to the “report” approach, it should also be studied as a specific suggestion for improvement in the Paris Agreement below. After discussing implementation, the following research focuses on “Compliance Mechanism”. “Many international procedures and mechanisms are available to assist in the pacific settlement of international disputes. Article 33 of *UN Charter*²⁹¹ identified the traditional mechanisms including negotiation, enquiry, mediation, conciliation, arbitration, judicial settlement, resort to regional agencies or arrangements, or other peaceful means of their own choice.

At present, informal and non-binding mechanisms are considered the effective ways and they are more recognized by the international community such as negotiations and consultations, supplemented by more formal mechanisms such as conciliation, arbitration and judicial settlement. For example, in the Fisheries Jurisdiction case and the North Sea Continental Shelf case, the ICJ believes that the most appropriate method for resolving disputes is the negotiation method. The goal should be to define the rights

²⁹⁰ Philippe Sands, *Principles of international environmental law*, 3rd ed (Cambridge ; New York: Cambridge University Press, 2012) at 143.

²⁹¹ The Charter of the United Nations, 26 June 1945, UNTS, (entered into force on 24 October 1945), online: <https://www.un.org/en/sections/un-charter/un-charter-full-text/>.

of both parties to balance and fairly control the distribution of benefits.²⁹² Therefore, we need to make full use of non-confrontational and non-punitive mechanisms in the process of resolving international disputes and promoting the countries to actively fulfill their obligations. The non-compliance mechanism below provides us with a good example.

2.3.1 The evolution of the Non-Compliance Mechanism

The number of international environmental treaties has been increasing. Countries around the world, especially developing countries, are bearing an increasingly heavy burden in implementing their obligations under international environmental treaties. At present, the international community is deliberately shifting its focus from the formulation of international environmental treaties to ensuring and promoting compliance and implementation of existing treaties. In this context, compliance mechanisms have emerged, and many international environmental treaties have established their own compliance mechanisms and procedures. Among them, the compliance mechanism of Kyoto Protocol is the most mature one in the international environmental treaties. However, the emergence of the compliance mechanism should date back to 1987.

In 1987, Article 8 of Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol) established the first non-compliance procedure. In 1990, the

²⁹² *Ibid.*

Implementation Committee was established by the second Meeting of the Parties to the Protocol. In 1992, the Parties agreed to establish the Implementation Committee on a permanent basis along with the Non-Compliance Procedure under which the Committee operates. Article 18 of the Kyoto Protocol call on the Conference of the Parties approve appropriate and effective procedures and mechanisms to determine and to address cases of non-compliance with the provisions of this Protocol.

In the Kyoto Protocol, this can also be defined as the non-compliance regime which, according to Article 18 of the Kyoto Protocol, shall be adopted as an amendment to the Protocol if it includes binding consequences for the parties. The Kyoto Protocol therefore provides for the establishment of a non-compliance regime and leaves it to the parties, under the guidance of the COP, to define the details and procedures regarding the functioning of such a mechanism.²⁹³ It is important at this point to stress that the non-compliance regime of the Kyoto Protocol consists of the Compliance Committee which is divided into a facilitative branch and an enforcement branch. The facilitative branch assists all parties in the Kyoto Protocol implementation, while the enforcement branch is a quasi-judicial body which can propose decisions on parties in non-compliance, such as non-eligibility to participate in the flexible mechanisms. The main task of the Compliance Committee is to consider the ‘questions of implementation’ referring to the compliance by Annex I parties with the different obligations established by the Kyoto Protocol. “These obligations are: 1. Monitoring, reporting and verification obligations under Articles 5(1) (2) and 7(1) (4) of the Kyoto Protocol (Monitoring,

²⁹³ Leonardo Massai, *The Kyoto Protocol in the EU: European Community and Member States under International and European Law* (The Hague, The Netherlands: TMCAsser Press, 2011) at 46.

Reporting and Verification— MRV—obligations); 2. Eligibility requirements as defined under Articles 6, 12 and 17 of the Kyoto Protocol and the Marrakech Accords (eligibility requirements); 3. Quantified emission limitation and reduction commitments (QELRCs) under Article 3(1) of the Kyoto Protocol (Limitation and Reduction commitments).”²⁹⁴

We compare the non-compliance clauses, as shown in the table below:

	Montreal Protocol	Kyoto Protocol
Provision	Article 8: Procedures and institutional mechanisms for determining non-compliance	Article 18: Procedures and mechanisms to determine and to address cases of non-compliance
Institution	Implementation Committee Meetings of Parties Secretariat	Conference of the Parties Compliance committee: Plenary; Bureau; the facilitative branch; the enforcement branch
Functions	To gather information and information; to maintain an exchange of information with the Executive Committee of the Multilateral Fund; to review the compliance procedures initiated by the Secretariat or the State Party and make	The facilitative branch: to provide advice and facilitation to Parties in implementing the Protocol; to promote compliance by Parties with their commitments under the

²⁹⁴ *Ibid* at 47.

	recommendations and measures for consideration by Meetings of Parties.	Protocol; to provide for early warning of potential noncompliance The enforcement branch: to determine whether a Party included in Annex I is not in compliance with the Protocol; Adjustments to inventories in the event of a disagreement between an expert review team
Trigger	The country itself; other countries; Secretariat	The country itself; other countries; expert review team
Consequences	Appropriate assistance, including assistance for the collection and reporting of data, technical assistance, technology transfer and financial assistance, information transfer and training; issuing cautions; suspension, in accordance with the applicable rules of international law concerning the suspension of the operation of a treaty, of specific rights and privileges under the Protocol, whether or not subject to time limits, including those concerned with industrial rationalization,	The facilitative branch: Provision of advice and facilitation of assistance; Facilitation of financial and technical assistance; Formulation of recommendations. The enforcement branch: to suspend the eligibility of that Party; Deduction from the Party's assigned amount for the second commitment period of a number of tonnes equal to 1.3 times the amount in tonnes of excess emissions. ²⁹⁵

²⁹⁵ United Nations, *Report of the conference of the Parties on its seventh session*, Official Records

	<p>production, consumption, trade, transfer of technology, financial mechanism and institutional arrangements.</p>	
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2.3.2 The Compliance Mechanism in the Paris Agreement

The non-compliance Mechanism of Kyoto Protocol have no longer application after 2020. Because, the Paris Agreement established an Enhanced Transparency Framework (ETF) designed to build trust and confidence that all countries are contributing to fulfil the international obligations. The Katowice conference in 2018 built a framework that is applicable to all countries by adopting a detailed set of modalities, procedures and guidelines (MPGs) that make it operational. “Conference of Parties recognizes that the Capacity-building Initiative for Transparency, established pursuant to decision 1/CP.21, will continue to support developing country Parties, upon request, to build their institutional and technical capacity, both pre- and post- 2020. It also recognizing that flexibility for those developing country Parties that need it in the light of their capacities is reflected in the modalities, procedures and guidelines for the transparency of action and support.”²⁹⁶ At the same time, Katowice conference put forward eight guiding principles for the modalities, procedures and guidelines of the enhanced transparency framework under the Paris Agreement. For example, it says the first guiding principle is “building on and enhancing the transparency arrangements under the Convention, recognizing the special circumstances of the LDCs and SIDS, and implementing the transparency framework in a facilitative, non-intrusive, non-

FCCC/CP/2001/13/Add.3 (Marrakesh, 2001) at 67-76, online: <https://unfccc.int/documents?f%5B0%5D=conference%3A3620&f%5B1%5D=conference%3A3614&search=&page=0%2C0%2C1>.

²⁹⁶ Conference of the Parties, *supra* note 270.

punitive manner, respecting national sovereignty and avoiding placing undue burden on Parties.”²⁹⁷ The Modalities, procedures and guidelines for the transparency framework of Article 13 in the Paris Agreement have come out and the non-compliance Mechanism of Kyoto Protocol is gradually replaced.

The Paris Agreement is based on equity and embodies the principles of common but differentiated responsibilities and respective capabilities, while emphasizing the need to be based on different national conditions. It noted the specific needs and special circumstances of developing country Parties, especially those of developing country that are particularly vulnerable to the adverse effects of climate change, and fully took into account the financing and technology transfer. The Paris Agreement states that Parties should respect, promote and consider their human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity. It not only requires the parties to respect the above rights, but also puts forward requirements for the implementation of this agreement. It believes that the parties must carry out education, training, publicity, public participation and public access to information and cooperation on the matters dealt with in this agreement. It recognizes the importance of governments and actors at all levels in addressing climate in accordance with the

²⁹⁷ The remaining seven principles are: The importance of facilitating improved reporting and transparency over time; Providing flexibility to those developing country Parties that need it in the light of their capacities; Promoting transparency, accuracy, completeness, consistency and comparability; Avoiding duplication of work and undue burden on Parties and the secretariat; Ensuring that Parties maintain at least the frequency and quality of reporting in accordance with their respective obligations under the Convention Ensuring that double counting is avoided; and Ensuring environmental integrity

respective domestic legislation of the Parties. Therefore, from the overall objective of the Paris Agreement, on the one hand, it stipulates international community should respect developing countries that are particularly vulnerable, and take full account of their difficulties and national conditions when implementing their obligations under the convention or the agreement. On the other hand, Paris Agreement stipulates the state's obligation to respect human rights and mentions the importance of domestic legislation for the implementation of international conventions or agreements. Although the goal of the Paris Agreement also falls on the state's fulfillment of international obligations and the promotion of the implementation of international conventions or agreements, there are some deficiencies in the content of the Paris Agreement on how countries comply with conventions and agreements and implement their obligations.

2.3.2.1 The deficiencies of the Compliance Mechanism

Article 13 and Article 15 of the *Paris Agreement* provides for a new compliance mechanism and it is different from the *Kyoto Protocol*. It has no mandatory compliance procedures, it is promotional, non-confrontational, non-punitive, and is of particular concern to the respective national capabilities of the Parties.

Status of Common but differentiated responsibilities. The Paris Agreement adheres to the CBDR principle within the framework of the Convention. In the Preamble, article 9 and article 13, the Paris Agreement separates the “least developed countries and small island developing States” from the camp of developing countries,

the classification of countries has shifted to developed countries, developing countries, least developed countries and small island developing States. Although the Paris Agreement still retains the distinction between developed and developing countries, it highlights that capable large developing countries should also contribute. That is to say, developed countries still need to support developing countries (including LDCs and SIDS), and capable developing countries should also provide assistance to LDCs and SIDS.²⁹⁸

The Paris Agreement does place “respective capabilities” in an important position, but it does not mean that the CBDR is weakened. The Paris Agreement’s method of distinguishing countries is likely to cause misunderstandings among countries about CBDR. It emphasizes that aid from capable countries also strengthens rather than weakens the CBDR principles. The Paris Agreement needs to further clarify the status of the CBDR.

The efforts of emission reduction and capacity building. Although “top-bottom” emission reduction model in the Kyoto Protocol has encountered obstacles at the implementation level, it can comprehensively consider long-term global greenhouse gas emission reduction goals, and has a strict verification mechanism and compliance mechanism. The “bottom-up” emission reduction model in the Paris Agreement allows

²⁹⁸ See Haitang Li, “Construction of International Climate Governance System under the new situation -- from the perspective of Paris Agreement” (2016) 3 J China Univ Polit Sci Law 101 at 103. See also Margaretha Wewerinke-Singh & Curtis Doebbler, “The Paris Agreement: Some Critical Reflections on Process and Substance” (2016) 39 UNSWLJ 1486 at 1489; Benoît Mayer, “Whose Loss and Damage: Promoting the Agency of Beneficiary States” (2014) 4 Clim 267 at 271.

countries to determine emission reduction targets through international negotiations according to their own circumstances, which is very flexible and voluntary. But this model is usually a short-term goal and lacks a link to long-term global emissions reduction targets. Although “global stocktake” is used as a way to evaluate the effectiveness of the implementation of the international climate agreement, its shortcomings are also obvious, that is, it is difficult to ensure the achievement of targets by relying on the parties’ independent emission reduction programs and actions. Fund and technology have been the two main ways to strengthen capacity building. As the previous climate change conferences have not been able to properly resolve financial and technical issues, countries will hope to pin the Paris Agreement. Article 9 of the Paris Agreement requires developed countries to mobilize climate funding from various sources, means and channels, and postponed the target of “100 billion dollars annually by 2020” to “100 billion dollars annually by 2025”, but it seems that the regulations did not satisfy people. In Article 10, the Paris Agreement reaffirmed the implementation of technology transfer without proposing new implementation measures. Therefore, the capacity building provisions of the Paris Agreement are more like a framework provision. Although they require more funding from developed countries, they lack a review mechanism and do not discuss the technology transfer mechanism²⁹⁹ in depth.

2.3.2.2 The recommendations for the Compliance Mechanism

²⁹⁹ In 2010 the Conference of the Parties established the Technology Mechanism. The Technology Mechanism consists of two bodies: the Technology Executive Committee and the Climate Technology Centre and Network. The Technology Executive Committee is the Technology Mechanism’s policy body. The Climate Technology Centre and Network is the implementation body of the Technology Mechanism. The Technology Executive Committee and the Climate Technology Centre and Network work together to enhance climate technology activities. Their functions are complementary and support developing country efforts to address both policy and implementation aspects of climate technology development and transfer.

The United Nations framework convention on climate change (UNFCCC), the Kyoto Protocol, the Paris agreement and many other climate change agreements all have the disadvantages. They lack a enforcement and a proper compliance mechanism. Some of the developed countries in annex I to the protocol have not kept their commitments and have not met their emission reduction targets. From the perspective of the implementation mechanism of the United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol, the default liability of defaulters is very limited, which is only reflected in the allocation of emission reduction in the second commitment period, and the punishment is insufficient. This situation has led some developed countries to attribute them to “soft law” all the time, making it unable to provide clear guidance for the specific implementation behavior of contracting Parties and international climate change law.

First, an international climate tribunal or court should be established. In 2010, the Cancun climate conference in Mexico proposed for the first time the establishment of an international climate tribunal to monitor the implementation of the convention. When a country implements the international climate conventions, the executive body of the convention shall supervise and monitor the emission reduction of each country according to the legal procedures. Because climate change is different from other issues. Climate change issues is complex and long-term. So it determines the difference between climate cases and other cases. Therefore, judges hearing climate cases need to have the necessary expertise in the field of climate. A special international climate tribunal should be set up to settle global climate disputes, so as to resolve international

disputes arising from the implementation of the climate change conventions and agreements.

To solve this problem requires some expertise. Just as in the case of “Whaling in the Antarctic (*Australia v. Japan: New Zealand inter interning*)”³⁰⁰, “scientific research purpose” of JARPA II³⁰¹ is the focus of controversy. How to identify “the purpose of scientific research” is an expertise issue that the International Court of Justice needs to address. For the reasons given in this Memorial, and reserving the right to supplement, amplify or amend the present submissions, Australia requests the Court to adjudge and declare that Japan is in breach of its international obligations in authorizing and implementing JARPA II in the Southern Ocean. The Court is requested to adjudge and declare that JARPA II is not a program for purposes of scientific research within the meaning of Article VIII of the *International Convention for the Regulation of Whaling (IWRWC)*.³⁰² Japan argues that Australia’s request should be rejected. Because Japan does not violate international obligations. JARPA II was established and implemented for scientific research purposes, in line with the exceptions under Article 8 of the *International Convention for the Regulation of Whaling (IWRWC)*³⁰³. At the same time, Japan did not violate the procedural requirements for whaling for scientific research.³⁰⁴ On 20 November 2012, New Zealand invoked article 36 of the Statute of the International Court of Justice to apply for participation in the proceedings. In February

³⁰⁰ *Australia v Japan: New Zealand inter interning*, 2014 ICJ.

³⁰¹ It is a whaling plan called “Plan for the Second Phase of the Japanese Whale Research Program under Special Permit in the Antarctic”.

³⁰² *Australia v. Japan: New Zealand inter interning*, 2014 ICJ at 17.

³⁰³ International Whaling Convention, 2 December 1946, (entered into force on 10 November 1948), online: <http://library.arcticportal.org/1863/1/1946%20IC%20for%20the%20Regulation%20of%20Whaling-pdf.pdf>.

³⁰⁴ *Australia v. Japan: New Zealand inter interning*, *supra* note 86 at 17.

2013, the International Court of Justice allowed New Zealand to participate in the proceedings.

New Zealand believes that Article 8 of the *International Convention for the Regulation of Whaling (IWhRC)* should be interpreted in good faith in accordance with the object and purpose of *International Convention for the Regulation of Whaling (IWhRC)*. In addition to interpreting the Convention, New Zealand also raised the issue of burden of proof New Zealand believes that Japan has not made a clear explanation on what is scientific research and whether Japan has the right to decide whether the whaling plan is for scientific research. New Zealand's statement is relatively vague, in fact it believes that Japan should prove its own JARPA II for scientific research.³⁰⁵ In the final, the Court stated that JARPA II is a continuous whaling program. It ordered Japan to revoke any existing authorizations, licenses and to avoid further licensing of the next step. The Court stated that all whaling activities that do not comply with Article 8 of *IWhRC* fall under the commercial whaling activities set out in paragraph 10 of the timetable. After four years, the case came to a final judgment, and the International Court of Justice faced many difficulties in the settlement of international environmental disputes. The international law regulating international relations are increasingly closely integrated with science and technology, and thus it has strong scientific and technical characteristics. Many international environmental disputes must be resolved based on the understanding of science.

³⁰⁵ *Ibid at 18.*

Arthur Cockfield put forward “A Synthetic Theory of Law and Technology”. He considers that “a synthetic theory of law and technology that could contribute to the development of legal analysis at the intersection of law and technology”. The theory is “synthetic” as it is based upon a synthesis of instrumental and substantive theories of technology. Generally speaking, instrumental theories tend to treat technology as a neutral tool without examining its broader social, cultural, and political impacts. In contrast, substantive theories emphasize the ways in which technological systems can exert “control” over individuals, often without their knowledge. A synthesis is necessary because each theory, standing alone, has disadvantages that reduce its potential for interfacing with legal analysis.³⁰⁶ Science and technology maybe different concepts. But in this part, I use understanding of science as a pre-procedure for technology. Of course, “A Synthetic Theory of Law and Technology” has a very reasonable place, however, I prefer to use technology as a tool in judicial proceedings. The case discussed above has been dealt with by the International Court of Justice, which took years to reach a judgement. Decisions are difficult to make because of a lack of scientific and technical knowledge. The discussion of this case was protracted and judicial resources were wasted. In the face of increasingly complex issues such as climate change, once it is incorporated into the scope of judicial practice, science and technology must be difficult to resolve. Only by increasing the professionalism of the courts can we better solve the problem.

Second, to establish the performance guarantee system. In the current climate

³⁰⁶ Arthur Cockfield, “A Synthetic Theory of Law and Technology” (2007) 8 Minn JL Sci Tech 475 at 475, 476.

change laws, there has been a lack of economic punishment system, which leads to the lack of enforcement of the climate change legal system. However, in the field of climate change, excessive economic penalties may reduce the capacity of the Parties to implement the convention. In addition, if the state itself fails to comply due to lack of funds, imposing financial penalties would be like adding insult to injury and further depriving the state of its capacity to implement the agreement. Therefore, the establishment of a performance guarantee system can be considered. All parties should pay a certain amount of performance guarantee fund, which can be used to pay the penalty when a state party defaults, so as to ensure the universal compliance and implementation of international climate change conventions or agreements.³⁰⁷

Third, to clarify the status of the common but differentiated responsibilities. Climate change conventions or agreements need to re-establish the status of CBDR principles and clarify the criteria. Although the Paris Agreement conditionally retains the CBDR principle, in the long term, the Paris Agreement lacks a relatively objective standard for classification.³⁰⁸ It is difficult to be accepted by countries all over the world to determine the state responsibility based on subjective identity standards, which will affect the realization of global climate justice. Therefore, there is an urgent need to establish a quantitative standard that can be recognized by both developed and developing countries. This standard will become the precondition of differential treatment. Therefore, it needs to be recognized by all countries. The specific meaning

³⁰⁷ Mingde Cao, "China's Legal Position and Strategy in Participating in International Climate Governance: From the Perspective of Climate Justice" (2016) 1 China Legal Science 29.

³⁰⁸ Li, *supra* note 298.

of common but differentiated responsibility principle and the development of this principle will be discussed in detail in Part 3.

An international climate tribunal or court under the climate change agreement is the most important of these three recommendations. The role of the law may be to resolve disputes. In order to urge countries to fulfill their obligations under international conventions, the establishment of specialized courts or arbitral tribunals is an effective form of supervision. Because, it can force countries to worry about being judged by the judiciary after disputes.

2.3.3 A new approach to compliance control---domestic courts

With the speed of the index after the Second World War, along with the spillover effects on the environment, the international community and national legislature responded with international treaties and national legislation to address different aspects of the environmental crisis. With new concerns about treaties and legislation, private law acts are effectively abandoned to address environmental issues. Environmental litigation has become the implementation of treaties and legislation, and is no longer a traditional private law act.³⁰⁹ At the same time, the role of non-governmental organizations (NGOs) and individuals in the international community has become increasingly apparent.³¹⁰ Many of non-governmental organizations (NGOs)

³⁰⁹ Brian J Preston, "Climate Change Litigation" (2011) 2011 Carbon Clim Rev 3 at 14. See also Hari Osofsky, "The Continuing Importance of Climate Change Litigation" (2010) 1 Clim 3.

³¹⁰ See Chiara Giorgetti, "The Role of Nongovernmental Organizations in the Climate Change Negotiations" (1998) 9 Colo J Intl Envtl Pol 115.

provide perspectives and information that are not commonly conveyed by states. NGOs are not merely driving forces in regime formation but are central in a legal framework that emphasizes inclusivity and accessibility.³¹¹ For example, The WTO Appellate Body Secretariat attempted this when it required NGOs who submitted amicus briefs in the Asbestos litigation to provide details of their interest in the claim. While many WTO Members were unhappy with what they perceived to be an illegitimate intervention by the Secretariat, the idea was sound. For NGOs to participate in regime interaction, they must be transparent about their funding, broadly accountable and have demonstrated expertise. There is further scope to develop alternative models to assess the credibility and accountability of non-state actors in regime interaction.³¹² It should be noted that the government needs to use criteria and procedures to assess the background, status, qualification and even reputation of NGOs, so as to ensure that the limited public participation areas are not abused by the subjects with poor qualification and credit.

The case between countries was discussed above, for example, the Trail Smelter Case; Pulp Mills on the River Uruguay (Argentina v. Uruguay); Nuclear Tests (Australia v. France). These cases drive the development of international environmental conventions, the international community has formed many types of international environmental conventions. Private law, individuals, and NGOs have played a role in the development of international conventions, and their domestic litigation have also

³¹¹ Margaret A Young, "Climate Change Law and Regime Interaction" 2011 Carbon Clim Rev 147 at 156. See also Chiara Giorgetti, "The Role of Nongovernmental Organizations in the Climate Change Negotiations" (1998) 9 Colo J Intl Env'tl Pol 115 at 115.

³¹² *Ibid.*

supervised the state's implementation of the conventions. (Part 2.4 will discuss in detail)

The new approach to compliance control---domestic courts is recognized by some international conventions. For example, Principles 10 and 13 of the Rio Declaration emphasize the important function of domestic courts in the context of environmental protection. It provides that "Environmental issues are best handled with the participation of all concerned citizens, at the relevant level....Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided." "States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also co-operate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction." "Their most important role is in enforcing national (and subnational) environmental laws and regulations, including those that implement environmental treaty obligations. A secondary role, and the one most relevant in this context, is their growing involvement in dealing with transboundary environmental dispute, chiefly through civil liability regimes. A third important function is in influencing the developing existing, rules and principles."³¹³

The new approach protects the interests of citizens of all countries, while promoting domestic legislative reforms, monitoring countries' compliance with

³¹³Tim Stephens, *International courts and environmental protection*, Cambridge studies in international and comparative law (Cambridge, UK ; New York: Cambridge University Press, 2009) at 79.

international conventions and fulfilling their international obligations. Therefore, it has a good future for development.

2.4 The domestic response to the climate change in China

In December 2018, the United Nations Climate Change Conference (COP24) in Katowice, Poland, completed the negotiation of the implementation rules of the Paris Agreement. It achieved a comprehensive, balanced and effective outcome, which will help the next comprehensive implement the requirements of the Paris Agreement. China's basic position and proposition on the Katowice Climate Change Conference: First, the negotiation of the implementation of the Paris Agreement on schedule should be the core task of the conference. It should adhere to the provisions of the Paris Agreement and ensure that the implementation arrangements of the agreement are reflected in detail and implemented. Common but differentiated responsibilities and the respective capacity principles, consider different national conditions, ensure that the follow-up arrangements reflect the balance of the package of results, and comprehensively cover all aspects of mitigation, adaptation, capital, technology, and capacity building. The second is to regard "implementation" as the main orientation of the conference, and to promote the implementation of the commitments and actions of the parties by 2020 and to lay a foundation for mutual trust for the implementation of the Paris Agreement after 2020. The international community should promote the early entry into force of the Kyoto Protocol Doha Amendment. Third, the promotion of dialogue should take the transition to green and low-carbon as an important signal from

the conference, and promote the exchange of best practices, explore opportunities for action, and promote international cooperation in an atmosphere of mutual trust, honesty, and win-win cooperation. The international community has passed on the implementation of the Paris Agreement in the field of climate change, promoting the global transition to a green and low-carbon, and building a positive signal of the community of human destiny. Fourth, we must properly solve the problem of funds as a breakthrough to promote the success of the conference. The high-level meeting of funds should be a political impetus for solving the problem of climate finance. Developed countries will give more detailed information on the implementation of the target of US\$100 billion per year by 2020. To meet the reasonable demands of developing countries on various climate funding issues.

During the conference, the China government delegation set up the “China Corner”³¹⁴ in the venue, covering topics such as low carbon development, carbon market, renewable energy, south-south cooperation, climate investment and financing, forest carbon sink, and local enterprise climate action. Three-dimensional publicity to introduce China’s policies to address climate change and promote green and low-carbon development.

In our perspective, China government formulates guiding policies internally and it adheres to its commitment in 2016 in NDCS: China has set its own action target by

³¹⁴ At the United Nations Climate Change Conference, it is a panel meeting initiated by China. It mainly introduces China's domestic policies and current situation in response to climate change, and introduces China's specific suggestions on international response to climate change.

2030: carbon dioxide emissions will peak around 2030 and strive to reach the peak as soon as possible; carbon dioxide emissions per unit of GDP will decrease by 60% - 65% compared with 2005, non-fossil energy will account for about 20% of primary energy consumption, and forest reserves will increase by 45% compared with 2005 About 100 million cubic meters.³¹⁵ China has a unified emission reduction target and each province in China determines its own emission reduction target according to its own situation, such as the number and scale of enterprises and the technical level of enterprises. The purpose of China's financial assistance to other countries is to fulfill the obligations of international cooperation and to help other countries with its own efforts, even if its own capacity is limited.

2.4.1 The functions of the National Development and Reform Commission

In 2003, the National Development and Reform Commission (NDRC) was established as a component of the State Council in accordance with the State Council's institutional reform plan approved by the First Session of the Eleventh National People's Congress and the State Council Notice on Institutional Establishment.

In 2007, the State Council adjusted the "National Leading Group on climate change". Former Premier Jiabao Wen of the State Council was the group leader, Vice

³¹⁵ *Intended Nationally Determined Contribution of the China*, Official Records, Official Records (USA, 2015), online: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/China%20First/China%27s%20First%20NDC%20Submission.pdf>.

Premier Li Keqiang and State Councilor Bingguo Dai were the vice leaders. There are 20 member units including the National Development and Reform Commission and the Ministry of Foreign Affairs. The NDRC is an integrated coordinating body for addressing climate change. Its functions in addressing climate change are: To study and propose major national strategies, plans and policies for addressing climate change, and to organize and implement domestic efforts to address climate change; to study and analyze major issues of international cooperation and foreign negotiations, to organize participation in international negotiations on climate change, to implement the UNFCCC, and to build the capacity to cope with climate change. Subsequently, the NDRC set up the Department of Climate Change, and defined its functions as: preparing for the plenary meeting of the leading group; studying and proposing major strategies and planning proposals for addressing climate change; coordinating cross sectoral and cross Bureau major issues related to climate change; organizing and coordinating the domestic implementation of the climate change convention and the Kyoto Protocol; and organizing participation in climate change negotiation and consultation.³¹⁶ The NDRC has 28 internal institutions, but the status of Department of Climate Change has not been clearly defined. It is only an institution under the NDRC and does not have the same status as other institutions. At present, the task of the Department of Climate Change is to coordinate other institutions, and to make policy recommendations on international issues related to climate change. The NDRC is still the main body to release final decisions and reports. From 2012 to 2017, the NDRC has released *China's Policies and Actions for Addressing Climate Change* in succession.

³¹⁶ "The National Development and Reform Commission", online: Main responsibilities of the NDRC <<http://www.ndrc.gov.cn/zwfwzx/jj/>>.

In addition to NDRC, the Ministry of Ecology and Environment is also an important department to deal with climate change. The mission of Ministry of Ecology and Environment is to improve environmental quality. Its mandates are (1) To establish and improve the fundamental system in China with respect to the ecological environment. (2) To coordinate, supervise, and regulate major ecological and environmental issues. (3) To supervise and administer to ensure the attainment of national emission reduction targets.....³¹⁷ The Ministry of Ecology and Environment is mainly responsible for supervising and controlling environmental pollution and reducing greenhouse gas emissions. In dealing with climate change, its task is to accept the coordination of NDRC. In the future, NDRC and the Ministry of Ecology and Environment will play a major role in China's response to climate change.

2.4.2 The laws and reports for the climate change

Climate resources scarcity determines the impact of it brings the world tends to be unbalanced and unfair. Because the atmosphere itself has such characters as liquidity, inseparable, these features make the impact of climate change range direct spread to every country in the world, but the first to be affected and the deepest degree is one of the most vulnerable and most poor countries and people. Historically, most developing countries contributed less to greenhouse gas emissions than developed countries. Based on this consideration, the Kyoto Protocol divides Annex I countries and non-Annex I countries. Although some developed countries objected to this classification, it was

³¹⁷ "Mandates", online: Ministry of Ecology and Environment the People's Republic of China <http://english.mee.gov.cn/About_MEE/Mandates/>.

finally established in the Kyoto protocol. This shows that the international community demands the developed countries to bear historical responsibilities. However, with the rapid development of developing countries, some developing countries are also responsible for the current climate change results. They also have a lot of greenhouse gas emissions, such as China and India. Therefore, the statement that the developed countries bear historical responsibility is no longer applicable to the present situation. We can't focus on the developed countries only. The international community should consider the contribution of all countries to greenhouse gas emissions. At the same time, countries like China or India should also take measures to actively reduce greenhouse gas emissions.

For China, under the framework of the United Nations Framework Convention on Climate Change and the Kyoto Protocol, it does not undertake compulsory emission reduction obligations. It cannot be explained by "capacity", let alone simply obtain support from the status of a "developing country", but only by consistent objective standards. It could be "cumulative emissions per capita" or other indicators. Any country meeting this target will have to undertake compulsory emission reduction obligations, and China is no exception.

China is the largest developing country in the world, and also the developing country with the largest greenhouse gas emissions. China has been participating in the international community's response to climate change with and China has carried out various actions to address climate change, including preparing for the formulation of

relevant policies. In 2007, the State Council promulgated the National Program to Address Climate Change. In August 2008, the Standing Committee of the National People's Congress made the Resolution of the Standing Committee of the National People's Congress on Actively Addressing Climate Change. In 2010, the State formulated the National "Twelfth Five-Year Plan" and set up the chapter of climate change response. The above policies and legal documents are generally in principle and they provide the basic direction for China's climate change legislation. In 2013, the National Development and Reform Commission, the National People's Congress Environmental Investment Commission, the National People's Congress Law and Work Commission, the State Council's Legal Office and relevant departments jointly established a leading group on the drafting of a law to address climate change, which started the drafting of the Climate Change Law of the People's Republic of China, and initially formed a legislative framework.³¹⁸

Since 2017, China has strengthened multi-level consultation and dialogue with other countries on climate change, promoted consensus building and China tried to promote the global climate governance and international cooperation on climate change. The China government has always participated in the Post-Paris agreement negotiations and worked for the establishment of a fair, equitable and win-win global climate governance system.³¹⁹ For example, in September 2017, China, the EU and Canada

³¹⁸ See National Development and Reform Commission, *China's Policies and Actions for Addressing Climate Change* (Beijing: National Development and Reform Commission, 2013) at 7.

³¹⁹ Ministry of Ecology and Environment of the People's Republic of China, *China's Policies and Actions for Addressing Climate Change* (Beijing: Ministry of Ecology and Environment of the People's Republic of China, 2018) at 45, 46.

jointly sponsored and hosted the first ministerial conference on climate action in Montreal, Canada, and in June 2018, the second ministerial conference on climate action in Brussels, Belgium. In September 2018, China, as the initiator, jointly established the global adaptation committee to promote international cooperation on climate change and global adaptation actions.³²⁰

In July 2017, the ministry of finance, the ministry of agriculture, the ministry of water resources and the ministry of land and resources jointly issued “Measures for the administration of subsidies for disaster relief in agricultural production and for flood control and drought relief from the central government”. China should respond to agricultural disasters, floods and droughts, and sudden geological disasters. The ministry of water resources conducted scientific flood control and water conservancy projects during the flood season, effectively prevented river floods, strengthened forecasting and early warning, issued 755 flood warnings to the public in a timely manner, launched 27 emergency responses, and sent more than 420 working groups to the frontline of flood and drought to support local governments in flood fighting and disaster relief.³²¹

China will strengthen the construction of key projects to harness rivers, promote the allocation of major water resources and key water source projects, and improve the defense against floods and droughts in river basins and ensure adequate water supply. China has improved its scientific and technological capabilities, continued to conduct

³²⁰ *Ibid* at 47.

³²¹ *Ibid* at 22.

research and development of global and regional climate models, continued to conduct research on climate change prediction, and carried out research and development of comprehensive impact assessment models. Establish a disaster monitoring and early warning mechanism. China issued “the notification of monitoring water resources capacity”, China should improve all levels of responsibility system for flood control and drought relief, perfect the flood prevention schemes to establish the drought monitoring system, construct 1021 automatic and manual monitoring sites. Scientific surveys of meteorological susceptibility diseases among regional populations were organized and early warning services for health risks of children in heat wave and high temperature were carried out in pilot cities.³²²

Policies and documents on climate change issued by the National Development and Reform Commission and the Ministry of Ecology and Environment mainly focus on energy conservation and emission reduction. China’s response to climate change is more focused on controlling and harnessing polluted gases, and the response to climate change is not only about controlling the emission of polluted gases. How to deal with the risks brought by climate change, how to improve the ability of adaptation and how to strengthen the legislation of adaptation are also the key issues in the process of China’s response to climate change. We can see that the legislative development of dealing with emergencies and sudden natural disasters is quite slow. There are mainly the following laws and regulations: *The General Emergency Plan for Public*

³²² *Ibid* at 24, 25.

Emergencies, The Law of the People's Republic of China on Emergency Response, The National Environmental Emergency Plan.

*The General Emergency Plan for Public Emergencies*³²³: In 2006, the State Council promulgated the General Emergency Plan for Public Emergencies, which clearly put forward the general principles for dealing with all kinds of public emergencies. It clearly puts forward six working principles for dealing with various types of public emergencies: people-oriented, reducing hazards; safety and security, prevention-oriented; unified leadership, hierarchical responsibility; standardization according to law, strengthening management; rapid response, coordinated response; relying on science and technology to improve quality. "General plan" is the general outline of the national emergency plan system. It clarifies the classification and framework system of all kinds of public emergencies, stipulates the organizational system and working mechanism of the State Council in dealing with special major public emergencies, and is a normative document guiding the prevention and disposal of all kinds of public emergencies.

*The Law of the People's Republic of China on Emergency Response*³²⁴: It was adopted by the 29th Meeting of the Standing Committee of the Tenth National People's Congress of the People's Republic of China on August 30, 2007, and has been in force

³²³ *The General Emergency Plan for Public Emergencies*, 2006, online: http://www.gov.cn/jrzg/2006-01/08/content_150878.htm.

³²⁴ *The Law of the People's Republic of China on Emergency Response*, 2007, online: http://www.gov.cn/ziliao/flfg/2007-08/30/content_732593.htm.

since November 1, 2007. “This Law is formulated in order to prevent and reduce the occurrence of emergencies, control, mitigate and eliminate serious social hazards caused by emergencies, regulate emergency response activities, protect the safety of people’s lives and property, and safeguard national security, public security, environmental security and social order.” “This Law shall apply to emergency prevention and emergency preparedness, monitoring and early warning, emergency disposal and rescue, post-accident recovery and reconstruction, etc.” “The term ‘emergencies’ as mentioned in this Law refers to natural disasters, accident disasters, public health incidents and social security incidents that occur suddenly and cause or may cause serious social hazards and need to be dealt with by emergency measures.” On the whole, the law considers that the disaster prevention is the main task and disaster treatments are the supplement measures. In order to conduct a comprehensive assessment of the emergency, it requires the government to establish a risk assessment system. It also mentioned the public’s awareness of risk prevention and control. Therefore, the law puts forward the requirements for the government and the public, and we believe that the national level risk assessment system is the most important one. However, the law is too general and principled to deal with climate change. In the field of climate change, how to conduct risk assessment should be further discussed. In combination with the Warsaw International Mechanism, the comprehensive assessment for the risk from climate change should be considered in the legislation and practice.

*The National Environmental Emergency Plan*³²⁵: On December 29, 2014, the State

³²⁵ The National Environmental Emergency Plan, 2014, online:
http://www.mee.gov.cn/ywgz/hjjj/yjzb/201912/t20191227_751708.shtml.

Council issued National Environmental Emergency Plan. It includes seven parts: general principles, organization and command system, monitoring, early warning and information report, emergency response, post-work, emergency support and supplementary rules, which will be implemented from the date of issuance.

China has no specific legislation on climate change adaptation measures. Some legal documents on prevention and corresponding emergencies guide China's adaptive measures. Therefore, China's climate change adaptation legislation is developing very slowly. Although China announced at the international conference that it will take a positive attitude to implement emission reduction measures, in the NDCs, China has determined its own action goal by 2030: carbon dioxide emissions peak around 2030 and strive to reach the peak as soon as possible.³²⁶ China will continue to adapt to climate change, and gradually improve its risk warning mechanism and disaster prevention and mitigation system.³²⁷ China's domestic efforts on adaptation measures are insufficient. At the same time, China has not expressed its attitude on "environmental refugees". At present, China does not accept people who are displaced due to the loss and damage of climate change.

2.4.3 Climate change litigation in China

³²⁶ *Intended Nationally Determined Contribution of the China*, Official Records, Official Records (USA, 2015), online: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/China%20First/China%27s%20First%20NDC%20Submission.pdf>.

³²⁷ *Ibid.*

In 2016, China Environmental Protection Federation³²⁸ v. Dezhou Jinghua Group Zhenhua Co., Ltd. was the first smog environmental public interest litigation in China. The plaintiff, China Environmental Protection Federation, complained that Zhenhua's two production lines had long discharged pollutants beyond the standard, causing serious air pollution, seriously affecting the lives of the surrounding residents, and had not been rectified after being punished by environmental protection authorities for many times, and continued to discharge pollutants into the atmosphere beyond the standard. The plaintiff requests the court to order that the defendant immediately stop discharging pollutants beyond the standard into the atmosphere and install additional facilities for preventing and controlling air pollution. Only after the competent administrative department of environmental protection has passed the acceptance test and put into use can he carry out production and business activities; the defendant compensates for the losses caused by discharging pollutants beyond the standard; the defendant compensates for the loss caused by refusing to correct the behavior of discharging pollutants beyond the standard; and Apologize publicly to the society; the defendant shall bear the expenses of litigation, inspection, appraisal, expert witnesses, lawyers and litigation expenses. The defendant Zhenhua Company responded that the defendant had stopped the infringement; the cause and effect of the plaintiff's complaint was difficult to determine, and the air pollution was dynamic and could not be determined that the air pollution was caused by an enterprise of the defendant; the appraisal opinion made by the plaintiff for damage was not recognized; the amount of

³²⁸ Approved by the State Council and registered by the Ministry of civil affairs, the China Environmental Protection Federation is a non-profit, national community organization voluntarily formed by people, enterprises and institutions who are enthusiastic about environmental protection and accept the business guidance, supervision and management of the Ministry of ecological environment and the Ministry of civil affairs.

damages claimed by the plaintiff and the claim for public apology by the media had no factual basis, and the plaintiff should consider it when making a claim. The defendant has actually invested in the operating costs; he agrees with the plaintiff's claim that the defendant place the compensation in a special financial account.

The court finally issued a judgment, requiring the defendant Dezhou Jinghua Group Zhenhua Co., Ltd. to compensate for the loss caused by excessive discharge of pollutants and pay to Dezhou City Special Fund Account³²⁹ for the restoration of Dezhou City's atmospheric environment quality; the defendant Dezhou Jinghua Group Zhenhua Co., Ltd. apologized to the public in the media above the provincial level; the defendant Dezhou Jinghua Group Zhenhua Co., Ltd. paid the plaintiff. Appraisal fees paid by the China Environmental Protection Federation (CEPA) and other litigation requests of the CEPA were rejected.³³⁰ The court held that the discharge of pollutants by enterprises, institutions and other producers and operators exceeding the pollutant discharge standards or the total emission control targets of key pollutants could be regarded as an act of great risk to the public interest. The excessive discharge of sulfur dioxide, nitrogen oxides and smoke and dust by the defendant Zhenhua Company will affect the service value function of the atmosphere. Among them, sulfur dioxide and nitrogen oxides are the precursors of acid rain. Excessive emissions can lead to property and personal damage. Excessive emissions of smoke and dust will affect the visibility

³²⁹ It is not an institution, but a fund account managed by Dezhou City. The funds of this account are mainly used for atmospheric environment quality restoration in Dezhou City.

³³⁰ "China Environmental Protection Federation v. Zhenhua Co., Ltd. of Dezhou Jinghua group, No. 10 of China's top ten influential lawsuits in 2016", online:
<http://www.pkulaw.cn/case/pfnl_1970324845557468.html?keywords=%E9%9B%BE%E9%9C%BE&match=Exact>.

and cleanliness of the atmosphere, and also cause property and personal damage. So the court asked Zhenhua Company to compensate for the loss caused by excessive discharge and to pay special fund for the restoration of the atmospheric environment quality in Dezhou City.

As governments try to solve climate change problems by formulating national policies or participating in international negotiations, environmental advocates increasingly turn to courts to fill the gaps in climate change governance. Lawsuits seeking to mitigate or adapt to climate change have been initiated in many jurisdictions and include a wide range of legal forms. Actions have been taken against businesses that emit large amounts of greenhouse gases into the atmosphere and governments that fail to fully integrate climate change into planning and development decisions. Despite this diversity, the plaintiff faces a series of recurring problems or challenges in court. These problems reflect the complexity of climate change and the challenges it poses to traditional legal forms and governance methods. The common issues in climate change litigation are as follows: whether a single pollution facility is responsible for the global impact of climate change; and how to prove the causal relationship between greenhouse gas emissions and damage consequences.³³¹ For example, in 2006, Massachusetts, 11 other states and several environmental advocacy organizations requested the US Environmental Protection Agency to require carbon dioxide as a pollutant for air pollution. The petitioners believe that carbon dioxide and other gases from motor vehicles contribute to global warming and climate change. According to the Clean Air

³³¹ Hilary Sigman, "Legal Liability as Climate Change Policy" (2007) 155 U Pa Rev 1953 at 1953.

Act, they claim that “it may be reasonably expected to endanger public health or welfare”. The Supreme Court ruled that if it finds harm to public health and welfare, the US Environmental Protection Agency must regulate the carbon dioxide emissions of cars. If the agency decides not to regulate emissions, the US Environmental Protection Agency must conclude that carbon dioxide emissions do not harm public health and welfare. In 2007, the US Supreme Court ruled in the “Massachusetts v. US Environmental Protection Agency” case, which held that carbon dioxide and greenhouse gases are air pollutants under the Clean Air Act and can be regulated by the Environmental Protection Agency (EPA).³³² The plaintiff believes that refusing to regulate such emissions will at least cause damage to Massachusetts, given that the US Environmental Protection Agency has failed to challenge the causal relationship between anthropogenic greenhouse gas emissions and global warming. The US Environmental Protection Agency considers this to be an exaggeration. It believes that its unregulated decision is so insignificant to the plaintiff that it cannot be brought to the federal court, and the relief sought will not alleviate global climate change and remedy the plaintiff’s injury. Realistic possibilities, especially as China, India and other developing countries increase emissions may offset the emission reductions brought about by US EPA regulations.³³³

As a policy to address climate change, three basic principles of responsibility have

³³² See “Massachusetts v. Environmental Protection Agency”, online: *Ballotpedia* <https://ballotpedia.org/Massachusetts_v._Environmental_Protection_Agency>.

³³³ See *Massachusetts et al v Environmental Protection Agency et al*, 2007 Supreme Court of the United States (available on <https://www.informea.org/en/court-decision/massachusetts-et-al-v-environmental-protection-agency-et-al>) at 3.

been proposed. First, it is possible to sue compensation for victims of climate change. Second, responsibility may motivate private actors to reduce greenhouse gas emissions. Finally, these lawsuits may change political conditions and facilitate the introduction of public policies to reduce greenhouse gas emissions.³³⁴ So far, climate change cases around the world have shown that courts have played a key role in adjusting legal governance systems to address complex climate change issues, and it is highly likely that they will continue to play such a role. Climate change litigation is a response to inadequate national legislation and efforts to promote broader legislative and policy changes or development. Principles formulated through litigation may serve as a basis for policy and legislation to address the effective convergence of climate change issues at the national and international levels. However, as stated in this paper, climate change litigation raises many difficult issues, and as a form of governance, it faces some challenges. Climate change litigation raises issues that cannot be resolved by courts, such as strong incentives and measures to reduce greenhouse gas emissions, and reforms in environmental assessment policies to promote flexibility and adaptability, which require government action.

From the United Nations Framework Convention on Climate Change to the Paris Agreement, these international conventions or agreements mainly put forward two kinds of obligations: mitigation obligations and adaptation obligations. How to ensure that the parties meet these obligations is crucial. Principles 10 and 13 of the Rio Declaration emphasize the important role of domestic courts in environmental

³³⁴ Hilary Sigman, "Legal Liability as Climate Change Policy" (2007) 155 U Pa Rev 1953 at 1953.
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protection. It provides that environmental issues are best addressed with the participation of all concerned citizens at the relevant level. At the national level, everyone should have appropriate access to information about environmental issues at the disposal of public institutions, including information about harmful substances and activities in their communities, and should have the opportunity to participate in decision-making processes. States should make information widely available in order to promote and encourage public understanding and participation. Effective access to judicial and administrative procedures, including compensation and remedies, should be provided. As for the implementation of international obligations, climate change litigation as a new way is worth learning from in China.

China's climate change policies and documents mainly focus on energy conservation and emission reduction. China is striving to establish a legal system and policy guidance for green production and consumption, and improve the green, low-carbon and circular economic system. China is striving to establish a market-oriented green technology innovation system, develop green finance, expand energy conservation and environmental protection industry, clean production industry and clean energy industry. At the same time, in judicial practice, the focus of the first public interest litigation of haze environment in China is also to control "excessive emission of pollutants". In the process of coping with climate change, China pays more attention to the control and treatment of pollution gases, while coping with climate change is not only to control the emission of pollution gases. How to deal with the risks brought by climate change, how to improve the adaptability and how to strengthen the legislation

of adaptability are also the key issues in the process of China's response to climate change. Mitigation and adaptation are key measures to deal with climate change, and their status is equally important. Countries should not be biased towards mitigation or adaptation. Legislation and policy should not tend to slow down and neglect the role of adaptation. Countries should address the relationship between mitigation and adaptation and strike a good balance between them. Especially in developing countries like China, they need to pay attention to climate change litigation. A series of issues raised in climate change litigation provide a new direction for national legislation on climate change in order to effectively fulfill international obligations.

With respect to legislation to combat climate change, apart from the *Decisions of the Standing Committee of the National People's Congress on the Ratification of the Framework Convention On Climate Change*³³⁵, issued in 1992, the special legal document is the Resolution on Active Response to Climate Change issued by the Standing Committee of the National People's Congress in August 2009, which declared the principles, positions, guidelines and policies of addressing climate change. Of that, it positioned climate change as an important opportunity and challenge for economic and social development, and emphasized the importance of strengthening the rule of law in dealing with climate change, enhancing the awareness and capacity of the whole society, and actively participating in international cooperation. Although the resolution deals with addressing climate change, it is primarily declaratory rather than normative.

³³⁵ "Decision of the Standing Committee of the National People's Congress on the ratification of the United Nations Framework Convention on climate change_ China National People's Congress website, online: <http://www.npc.gov.cn/wxzl/gongbao/1992-11/07/content_1479248.htm>.

At present, China's legislation on climate change is prominent in the legislative concept and specific legal system, which fails to deal with the adverse effects of climate change in a long-term, systematic and effective way, including the loss and damage in the wake of climate change, in no small measure. As things stand, China's legislation on climate change is lagging behind. Since the legal concept is the value orientation or spiritual guide implied by the law, it is necessary to attach equal importance to mitigation and adaptation in dealing with climate change. Of that, the legal concept of attaching equal importance to mitigation and adaptation should first be confirmed in the *Constitution of the People's Republic of China*³³⁶, so to speak, the constitutional basis of the legislative concept should be provided first. In China, the practice of addressing climate change has been pushed forward, and arrangements for addressing climate change have been reflected in some policy documents. At present, however, China has neither comprehensive legislation to tackle with climate change, nor any laws and regulations in the name of "climate change". Even the existing laws and regulations do not include "climate change" and relevant legal concepts, and the legal system to cope with climate change is seriously lacking. Plus, the necessary legislation to deal specifically with climate change is incomplete in China. And then, the existing legislation is mainly a document issued by the National Development and Reform Commission (or its joint efforts with relevant departments) and has more general provisions on dealing with climate change.

Although China has a vast territory, its regional economic development is uneven,

³³⁶ *Constitution of the People's Republic of China*, 1982, online:
http://english.www.gov.cn/archive/laws_regulations/2014/08/23/content_281474982987458.htm.

and it is difficult to make detailed provisions in national legislation related to climate change, which provides a broad space for local legislation to promote climate change. In 2015, the revision of the *Legislation law of the people's Republic of China*³³⁷ extended the subject of local legislation to “cities divided into districts”, whose People’s Congress and its Standing Committee may formulate local regulations and rules on environmental protection and other matters according to the specific situation and actual needs of the city, provided that the laws at different levels are inconsistent with each other. “City divided into districts” is a legal term, and its coverage is basically the same as that of prefecture-level cities. There are also a few prefecture-level cities without municipal districts, such as Dongguan and Zhongshan in Guangdong Province, Jiayuguan in Gansu Province, and Sansha in Hainan Province. But Legislation Law also empowers it to apply mutatis mutand the provisions governing the granting of local legislative powers to cities divided into districts. Moreover, the revised Legislation Law not only establishes the law as the benchmark of the unified order, but also allows the production of multiple laws under the unified order, which further realizes the dynamic maintenance of the legislative purpose and establishes the legal basis for local regulations and local government regulations that are suitable for local places.

As far as addressing climate change is concerned, China should first update its legislative concept, attach equal importance to mitigation and adaptation, and promote legislation to address climate change, so as to avoid articles of principle and declaration. Plus, Chinese government should support local legislation and formulate specific

³³⁷ *Legislation law of the People's Republic of China*, 2000, online: http://www.gov.cn/test/2005-08/13/content_22423.htm.

mitigation and adaptation measures according to the specific conditions of each province to promote the updating of China's constitutional concept via practical experience of each province, so as to provide a constitutional basis for dealing with the adverse impacts and even loss and damage of climate change in the future.

Part 3 The basic principle for addressing the Loss and Damage: common but differentiated responsibility principle

There is currently no uniform definition of what environmental principles are. Eloise Scotford considered “there is no definitive and universal catalogue of environmental principles. Further, it is not possible to state definitively what an ‘environmental principle’ is or means. Environmental principles are primarily policy ideas concerning how environmental protection and sustainable development ought to be pursued. They are ‘policies’ in the broad sense that environmental principles reflect courses of actions adopted to secure, or that tend to secure, a state of affairs conceived to be desirable.”³³⁸

In the case law of the European courts, six environmental principles can be identified. “These are the preventive principle, the principle of rectification at source, and the precautionary principle, the polluter pays principle, the integration principle, and the principle of sustainable development. In the case law of the New South Wales, there is some overlap with these EU law environmental principles, although they are referred to as principles of ‘ecological sustainable development’ in New South Wales law. Thus there are identifiable versions of the precautionary principle, the polluter pays principle and the integration principle, although the latter two have explicitly different manifestations.”³³⁹

³³⁸ Eloise Scotford, *Environmental principles and the evolution of environmental law* (Oxford: Hart Publishing, 2017) at 6. See also Philippe Sands, *Principles of international environmental law*, 3rd ed. (Cambridge ; New York: Cambridge University Press, 2012) at 163.

³³⁹ See *ibid* at 7.

All these environmental principles have a high profile in environmental law and policy internationally, and in environmental law scholarship. They constitute a group of policies and flourished the international environmental law, they also are becoming the legal instruments in the international environmental law.

The profile of environmental principles in environmental law has particularly grown internationally in recent decades because of their increasing presence in international treaties and soft law agreement, binding regional agreements, and domestic legislation. The wide range of environmental principles that have been formulated in international soft law agreements concerning sustainable development are of particular significance, since these provide an apparent basis on which to build a universal understanding of environmental principles as legal concepts.³⁴⁰ This section will describe the general principles and rules of international environmental law. These principles are general in nature as they may apply to all activities carried out or authorized by all members of the international community and apply to all aspects of the protection of the environment. As can be seen from a large number of international agreements and other acts, although general rules and principles are not necessarily universal, they are widely supported and often endorsed in practice.

3.1 Overview of general principles in the international environmental law

³⁴⁰ *Ibid at 9.*

The principles of international environmental law are guiding acts of international organizations and practice of States. There are: the principle reflected in Principle 21 of the Stockholm Declaration³⁴¹ and Principle 2 of the Rio Declaration³⁴², namely, that states have sovereignty over their natural resources and the responsibility not to cause transboundary environmental damage; the principle of preventive action; the principle of co-operation; the principle of sustainable development; the precautionary principle; the polluter-pays principle; and the principle of common but differentiated responsibility.³⁴³

States have sovereignty over their natural resources and the responsibility not to cause transboundary environmental damage. This principle is also called “no harm principle”. Principle 21 of the Stockholm Declaration proposed the no harm principle. It was re-emphasized in the principle 2 of the 1992 Rio Declaration. This principle has been reaffirmed in the *United Nations Framework Convention on Climate Change*, *Vienna Convention for the Protection of the Ozone Layer*³⁴⁴, *United Nations Convention to Combat Desertification in those Countries Experiencing Serious*

³⁴¹ Principle 21: States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction. See online: <http://journals.sagepub.com/doi/10.1177/0019556119890340>.

³⁴² Principle 2: States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction. See online: http://www.unesco.org/education/pdf/RIO_E.PDF.

³⁴³ Philippe Sands, *Principles of international environmental law*, 2nd ed. (Cambridge ; New York: Cambridge University Press, 2003) at 231.

³⁴⁴ Vienna Convention for the Protection of the Ozone Layer, 22 March 1985, 26 ILM 1516, (entered into force 22 September 1988).online:http://mountainlex.alpconv.org/images/documents/international/convention_ozone_layer.pdf.

*Drought and/or Desertification*³⁴⁵. This principle is expressed as that “States have the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction”.

The “no harm principle” is based on the responsibility of the State not to harm other countries or the environment beyond their jurisdiction. Under international law, states have a responsibility not to cause harm to or infringe on the rights of other states. The “no harm principle” was first used to solve the problem of transboundary damage. At the same time, it is gradually accepted as international customary law.³⁴⁶ As climate change became more and more serious, it was gradually required to be applied to the field of loss and damage caused by climate change. Palau sought the advisory opinion of the International Court of Justice at the United Nations General Assembly to clarify whether states have a legal responsibility to ensure that any greenhouse gas emissions on their territory do not harm other countries. In fact, regardless of whether the advisory opinion of the International Court of Justice is put forward, countries based on the customary international law in the field of international environmental law have an obligation to ensure that greenhouse gas emissions do not harm the development of other countries. No one can do that to harm the development of other regions and

³⁴⁵ United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, online: https://treaties.un.org/doc/Treaties/1996/12/19961226%2001-46%20PM/Ch_XXVII_10p.pdf.

³⁴⁶ See Roda Verheyen, *Climate change damage and international law: prevention, duties and state responsibility* (Leiden ; Boston: MNijhoff ; Brill, 2005) at 145.

countries. The severity of the loss and damage caused by climate change has already hindered the sustainable development of small island nations. Therefore, all countries have an obligation to take action to support and guarantee the sustainable development of countries that are particularly vulnerable to climate change. At the same time, all countries have an obligation to achieve intergenerational equity without harming the interests of future generations.

At present, this principle has been generally accepted by the international community, and it seems that it can be used to solve the problem of loss and damage caused by climate change. However, since this principle was originally intended to solve the problem of transboundary damage, but the loss and damage caused by climate change is not transboundary damage (discussed in the part 1), this principle can't be completely used as a basic principle to deal with climate change.

The principle of co-operation. The principle has broad practical significance. Climate change has become a common concern of all countries in the world, and its results are mainly reflected in the UNFCCC and the Paris Agreement. As the basis of international cooperation, the conventions and the agreements have a guiding role for countries to fulfill their international obligations.

Principle 24 of the Stockholm Declaration reflects a general political idea on the international cooperation:

“International matters concerning the protection and improvement of the environment should be handled in a cooperative spirit by all countries, big and small, on an equal

footing. Cooperation through multilateral or bilateral arrangements or other appropriate means is essential to effectively control, prevent, reduce and eliminate adverse environmental effects resulting from activities conducted in all spheres, in such a way that due account is taken of the sovereignty and interests of all States.”³⁴⁷

Principle 27 of the Rio Declaration states more succinctly:

“States and people shall co-operate in good faith and in a spirit of partnership in the fulfilment of the principles embodied in this Declaration and in the further development of international law in the field of sustainable development.”³⁴⁸

The principle of “good-neighborliness” enunciated in Article 74 of the UN Charter in relation to social, economic and commercial matters has been translated into the development and application of rules promoting international environmental co-operation. The principle is reflected in many treaties and other international acts, and is supported also by state practice, in particular in relation to hazardous activities and emergencies.³⁴⁹ The obligation to co-operate is affirmed in many bilateral and global international agreements³⁵⁰. It is also confirmed by the ICJ in the cases to establish the suitable common regimes.³⁵¹ This principle starts with “good faith” and involves multiple concepts, such as “partnership”, and “good-neighborliness”. The above also mentioned the cooperation of countries in some activities for reducing greenhouse gas emission, including information exchange and sharing. Under the Warsaw International Mechanism, it also mentioned the sharing of information and technology cooperation. Therefore, this principle is also common in the field of climate change.

³⁴⁷ Stockholm Declaration, 16 June 1972, UNTS, online:

<http://journals.sagepub.com/doi/10.1177/0019556119890340>.

³⁴⁸ Rio Declaration on Environment and Development, 14 June 1992, UNTS, online:

http://www.unesco.org/education/pdf/RIO_E.PDF.

³⁴⁹ Philippe Sands, *Principles of international environmental law*, 3rd ed. (Cambridge ; New York: Cambridge University Press, 2012) at 249.

³⁵⁰ 1982 UNCLOS, Article 123 and 197; 1985 Vienna Convention, Article 2(2); 1992 Biodiversity Convention, Article 5.

³⁵¹ *Case Concerning the Kasikili/Sedudu Island (Botswana/Namibia)*, 1999 ICJ.

It is universally applicable to countries in dealing with international relations, including in the field of international negotiations to address climate change. Because of this universality, it cannot be a special or basic principle guiding climate change.

The principle of sustainable development. Sustainable development has been accepted as global policy. The origins of the concept lie in provisions relating to the sustainable use of natural resource such as those found in the international law of fisheries.³⁵² But when it comes to environmental and social issues, the emergence of this principle dates back to 1992.

The concept appears, often as an objective or preamble reference, in most international statements and declarations related to environmental, social and economic issues since the 1992 Rio de Janeiro Earth Summit. It is not clear that “sustainable development”, as such, can be accurately described as a single emerging principle of international environmental law, or as a customary norm that will eventually be accepted as binding on all States.³⁵³

It is currently difficult to describe “sustainable development” as a binding international legal principle. In international law, the concept of sustainable development may be binding on treaties and may also serve as a norm used by judges or governments to deal with specific issues. It may also be non-binding, but it is still

³⁵² Nico Schrijver, *The evolution of sustainable development in international law: inception, meaning and status*, Pocketbooks of the Hague Academy of International Law (Leiden ; Boston: Martinus Nijhoff, 2008) at 209.

³⁵³ Marie-Claire Cordonier Segger, *Sustainable development law: principles, practices, and prospects*, Oxford Scholarship Online (Oxford ; Toronto: Oxford University Press, 2004) at 45.

convincing. International law increasingly includes legal instruments that may not be formally binding. Both the 1972 Stockholm United Nations Conference on the Human Environment and the 1992 Rio United Nations Conference on Environment and Development have made important contributions to the development of this new international policy discourse model. There are many so-called “soft laws” in international law related to sustainable development. For various reasons, countries sometimes prefer non-binding documents. Because, it seems easier to reach an agreement, the transaction costs are lower, the chances of developing a detailed strategy are greater, and often, the norm seems to respond better to scientific understanding or rapid economic changes under economic or social conditions.

The principle of preventive action and the precautionary principle. The precautionary principle is analyzed by some authors as a furthering of the principle of prevention of damage to the environment, which is itself undoubtedly well established as a norm of international customary law. The principle of precaution can be understood as a pre-prevention principle that dictates the application of measures earlier in the time-scale applicable to prevention measures, when science cannot prove that harm will occur, but there are risks that it will. It was noted that prevention and precaution cannot be separated easily. Both impose obligations of means and not of results, and both deal with potential future damage. The doctrine of precaution confronts the damage earlier than the doctrine of prevention.³⁵⁴

³⁵⁴ Benedicte Sage-Fuller, *The precautionary principle in marine environmental law: with special reference to high risk vessels*, Routledge research in international environmental law (London ; New York: Routledge, 2013) at 68.

As we can see, Philippe Sands and Benedicte Sage-Fuller separated the “precaution” and “prevention”, and they thought the concepts are different. But I have discussed them above, the two concepts are universal in judicial practice because it is very difficult to distinguish which time is earlier.

The polluter pays principle. It indicates that the costs of pollution should be borne by the person responsible for causing the pollution. The meaning of the principle, and its application to particular cases and situations, remains open to interpretation, particularly in relation to the nature and extent of the costs included and the circumstances in which the principle will, perhaps exceptionally, not apply. The principle has attracted broad support, and is closely related to the rules governing civil and state liability for environmental damage.³⁵⁵ In view of the different contributions to global environmental degradation, countries have common but differentiated responsibilities. In view of the pressure exerted by societies on the global environment and the technological and financial resources they possess, developed countries recognize their responsibility for pursuing sustainable development.³⁵⁶

In climate change area, as developed countries continue to emit large quantities of greenhouse gases, they violate the precautionary principle, so polluters should make efforts to do so. Principle 16 of the Rio Declaration provides that:

“National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public

³⁵⁵ Philippe Sands, *Principles of international environmental law*, 3rd ed. (Cambridge ; New York: Cambridge University Press, 2012) at 228.

³⁵⁶ See the Rio Declaration, June 1992, ILM, online: http://www.unesco.org/education/pdf/RIO_E.PDF.

interest and without distorting international trade and investment.”³⁵⁷

In combination with the principle of common but differentiated responsibilities, it is a moral and legal assumption that those who cause global climate change pollution should also reduce greenhouse gas emissions and help others adapt to the negative effects of pollution. This kind of greenhouse gas pollution can be described as a tort, and the polluter should pay a price for the economic benefits from the pollution. The polluter pays principle is the most powerful model of liability applicable to transnational corporations, which has been found in many multilateral environmental agreements, which directly stipulate that companies should bear legal responsibility for transboundary pollution they create.

The first international instrument to refer expressly to the polluter pays principle was the *1972 OECD Council Recommendation on Guiding Principles Concerning the International Economic Aspects of Environmental Policies*.³⁵⁸ It described mainly the international aspects of environmental policies with particular reference to their economic and trade implications.

It said “Environmental resources are in general limited and their use in production and consumption activities may lead to their deterioration. When the cost of this deterioration is not adequately taken into account in the price system, the market fails to reflect the scarcity of such resources both at the national and international levels. Public measures are thus necessary to reduce pollution and to reach a better allocation of resources by ensuring that prices of goods depending on the quality and/or quantity of environmental resources reflect more closely their relative scarcity and that economic agents concerned react accordingly.”³⁵⁹

³⁵⁷ *Ibid.*

³⁵⁸ Philippe Sands, *Principles of international environmental law*, 3rd ed. (Cambridge ; New York: Cambridge University Press, 2012) at 230.

³⁵⁹ 1972 OECD Council Recommendation on Guiding Principles Concerning the International Economic Aspects of Environmental Policies, 26 May 1972, 14 ILM, online: <https://legalinstruments.oecd.org/en/instruments/4>.

The polluter pays principle involves the cost allocation, which is to allocate the cost of pollution prevention and control measures so as to encourage the rational use of environmental resources and avoid the distortion of international trade and investment. This principle involves polluting gases, and we should be clear about whether carbon dioxide is a polluting gas. This issue is discussed most enthusiastically in the United States. In *Massachusetts v. Environmental Protection Agency* (in 2007), the US Supreme Court held that the *Clean Air Act* gives the EPA the authority to regulate tailpipe emissions of greenhouse gases. Two years after the Supreme Court ruling, in 2009, the EPA issued an endangerment finding concluding that “greenhouse gases in the atmosphere may reasonably be anticipated both to endanger public health and to endanger public welfare.”³⁶⁰

Greenhouse gases, including CO₂, meet the definition of “air pollutants” in the *Clean Air Act* and must be regulated by the EPA if it can be determined that they are hazardous to public health or welfare. Therefore, carbon dioxide is an air pollutant in the United States and if it endangers public health or welfare, it must be regulated. However, in most countries, there is a question as to whether carbon dioxide is classified in polluting gases. This is a problem that needs to be discussed. So far, no consensus has been reached. Therefore, how this principle is applied to the field of climate change is uncertain.

³⁶⁰ “Is CO₂ a pollutant?” online: *Skept Sci* <<https://skepticalscience.com/co2-pollutant-advanced.htm>>.

The principle of common but differentiated responsibility has been developed from the application of equity in general international law, and the recognition that the special needs of developing countries must be taken into account in the development, application and interpretation of rules of international environmental law.³⁶¹ It is provided in the Principle 7 of the Rio Declaration: States shall co-operate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.³⁶²

The legal obligations come first from common but differentiated responsibility's status as an emerging principle of customary international environmental law. But common but differentiated responsibility is also the explicit legal foundation of the UNFCCC or Kyoto Protocol.³⁶³ This principle of common but differentiated responsibility appears throughout the UNFCCC and Kyoto Protocol. Common but differentiated responsibility has been called the "ethical anchor" of the Kyoto Protocol. One could also call it the legal anchor.³⁶⁴ Because developed countries have caused and continue to cause disproportionate greenhouse gas pollution and benefit

³⁶¹ Philippe Sands, *Principles of international environmental law*, 3rd ed. (Cambridge ; New York: Cambridge University Press, 2012) at 233.

³⁶² See Rio Declaration, June 1992, ILM, online: http://www.unesco.org/education/pdf/RIO_E.PDF.

³⁶³ David Takacs, "Carbon into Gold: Forest Carbon Offsets, Climate Change Adaptation, and International Law" (2009) 15 *Hastings W-Nw J Envtl Pol* 39 at 49. See also Rajamani Lavanya, "Differentiation in the Emerging Climate Regime" (2013) 14 *Theor Inq* 151 at 152.

³⁶⁴ *Ibid.*

disproportionately from it, and developing countries will be unfairly damaged by climate change. So developed countries have legal responsibility and financial and technical means to mitigate this problem.

3.2 The conceptual framework of common but differentiated responsibility principle

3.2.1 Common responsibility

The principle of common but differentiated responsibility includes two elements. The first concerns the common responsibility of States for the protection of the environment, or parts of it, at the national, regional and global levels. The second concerns the need to take account of differing circumstances, particularly in relation to each States' contribution to the creation of a particular environmental problem and its ability to prevent, reduce and control the threat.³⁶⁵ Common responsibility describes the shared obligations of two or more states towards the protection of a particular environmental resource, taking into account its relevant characteristics and nature, physical location, and historic usage associated with it.³⁶⁶

“Common Concern”. It has found the clear formulation related to climate change

³⁶⁵ Philippe Sands, *Principles of international environmental law*, 3rd ed. (Cambridge ; New York: Cambridge University Press, 2012) at 233. See also Marian Buda, “Common but Differentiated Responsibility-International Environmental Law Principle” (2016) 2 J.L. & Pub. Admin. 82 at 82.

³⁶⁶ Philippe Sands, *Principles of international environmental law*, 3rd ed. (Cambridge ; New York: Cambridge University Press, 2012) at 234.

in the United Nations Framework Convention on Climate Change (UNFCCC), and protected biodiversity in the Convention on Biological Diversity. It covers all aspects of the global environment, which, because of their importance and the need for collective action to protect them, are designated as issues of common concern to mankind, whether in treaties or in decisions of the United Nations General Assembly. They supports the concept of ‘common concern’, as reflected in the UNFCCC, which acknowledges that ‘change in Earth’s climate and its adverse effects are a common concern of humankind’³⁶⁷, and the Convention on Biological Diversity affirms that ‘biological diversity is a common concern of humankind’³⁶⁸. The Nagoya Protocol to the Biodiversity Convention doesn’t have the concept but it recognizes “the interdependence of all countries with regard to genetic resources for food and agriculture”³⁶⁹. Common concern has been focused in matters that are of “concern” to humanity as a whole. At present some of those issues are climate change, species in danger and conservation of the biodiversity.

It has nothing to do with national jurisdiction³⁷⁰, it just stays in the field of people’s consciousness, and has not yet formed an international law concept. The loss and damage from climate change brings many problems to dozens of countries in the world. In the face of more and more global problems, no country can be immune to it, and any

³⁶⁷ See United Nations Framework Convention on Climate Change, 4 June 1992, UNTS, (entered into force 21 March 1994), online: <https://unfccc.int/resource/docs/convkp/conveng.pdf>.

³⁶⁸ See Convention on Biological Diversity, 5 June 1992, 8 UNTS 214, (entered into force 29 December 1993), online: <https://www.cbd.int/doc/legal/cbd-en.pdf>.

³⁶⁹ The Nagoya Protocol, 29 October 2010, (entered into force on 12 October 2014), online: <https://www.cbd.int/abs/doc/protocol/nagoya-protocol-en.pdf>.

³⁷⁰ Jimena Murillo, “Common Concern of Humankind and Its Implications in International Environmental Law” (2008) 5 Macquarie J Intl Comp Envntl 133 at 141.

country should pay attention to it. So preventing and dealing with the loss and damage caused by climate change is a common concern of mankind. It is essential to understand that the climatic resources cannot be divided in geographic sectors according to the borders of each state; the climatic resources is a global ecosystem and it is affected as a whole by the individual actions taken by single countries. Therefore we now need to follow and implement international standards and minimums by all states.

“Common responsibility”. The global impact of environmental issues requires a collective response, and collective responses should be based on shared responsibility. Legally, common but differentiated responsibility describe the common obligations of two or more states to protect specific environmental resources. On the other hand, it has been recognized that it is necessary to establish different levels so that different states can effectively adopt collective responses based on their capabilities and contribution to problems.

In the area of addressing climate change, common responsibility lays the legal foundation for Parties to response the loss and damage caused by climate change. State responsibility is an important principle that has long been established in international law. According to traditional international law, State responsibility refers to the responsibility of a State for its internationally wrongful act. If a country violates the obligations of international law and harms the interests of other countries, the country must assume responsibility in international law later. State responsibility developed the responsibility of non-prohibition of international law. State responsibility arising from

acts not prohibited by international law is actually a liability for transboundary damage. The conduct carried out by the State is not prohibited by international law, regardless of whether the State is at fault or not, and as long as there is serious damage, the State should assume state responsibility. As mentioned above, the responsibility for loss and damage caused by climate change is not a traditional state responsibility nor a responsibility for transboundary damage. It is a special responsibility that requires all countries to jointly take countermeasures.

Common concern relates to the problem of universal concern and is a psychological state of human beings. The common responsibility in the climate change area requires countries to take countermeasures. The international community is a society where sovereign states coexist. In the legal order of this society, all countries are independent sovereign states. Therefore, every country, big or small, strong or weak, and whatever political and economic system it has, should respect each other's sovereignty and communicate equally, which is the basis for international cooperation³⁷¹. Each country has equal legal status in international law, which means that all countries not only have equal rights, but also perform obligations and assume legal responsibilities equally. Therefore, in dealing with the loss and damage caused by climate change, all countries should fulfill their international obligations, take measures and bear the responsibility for the loss and damage.

³⁷¹ See Feng Liu, "On sovereignty and international cooperation" (2003) 2:3 J Shaoyang Univ 133 at 141. See also Huaiqiang Song, "An analysis on 'Draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities'" (2010) 12 Leg Syst Soc.

3.2.2 Differentiated responsibility

A series of resource issues, such as the oil crisis in the 1970s, negotiations on the law of the sea and the distribution of proceeds from deep seabed mining, have raised questions about the ownership of natural resources and the international obligations of the rich countries. Therefore, different treatments have also been proposed in the handling of international relations.

In practical terms, differentiated responsibility may result in different legal obligations.³⁷² “Differential treatment are littered through international environmental agreements, and can be divided into three broad categories: (1) provisions that differentiate between industrial and developing countries with respect to the central obligations contained in the treaty, such as emissions reduction targets and timetables; (2) provisions that differentiate between industrial and developing countries with respect to implementation, such as delayed compliance schedules, permission to adopt subsequent base years, delayed reporting schedules, and softer approaches to non-compliance; (3) provisions that grant assistance, *inter alia*, financial and technological.”³⁷³

Lavanya Rajamani considers different treatment means different central

³⁷² Philippe Sands, *Principles of international environmental law*, 3rd ed. (Cambridge ; New York: Cambridge University Press, 2012) at 235. See also Marian Buda, “Common but Differentiated Responsibility-International Environmental Law Principle” (2016) 2 J.L. & Pub. Admin. 82 at 84.

³⁷³ Lavanya Rajamani, *Differential treatment in international environmental law* (Oxford ; Toronto: Oxford University Press, 2006) at 93-94. See also Rajamani Lavanya, “Differentiation in the Emerging Climate Regime” (2013) 14 Theor Inq 151 at 154.

obligations, different implementation and some countries grant assistance. UNFCCC and the Kyoto protocol all stipulate “differentiated responsibilities.” And the UNFCCC and the Kyoto Protocol mainly emphasize the mitigation obligations. When Parties fulfill their mitigation obligations, they consider differentiated responsibilities and consider the historical responsibility of developed countries. The Article 9 of the Paris Agreement prescribes that “developed country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention.” Obviously, in the Paris Agreement, differentiated responsibilities are not only the guiding principle for Parties to fulfill their mitigation obligations, but also the requirements for Parties to fulfill their adaptation obligations. There is a gap in adaptive capacity between the developed countries and developing countries and the gap covers three important areas: finance, technology and knowledge. Differentiated responsibilities can push the developed countries or some capable countries providing financial, technological and knowledge assistance to countries particularly vulnerable to climate change to narrow the adaptation gap.

“The presence of the principle of CDR is the result of a complex negotiation process between developing and developed countries. Developed countries wanted an inclusive international agreement for maximum effect and legitimacy. Developing countries hesitated to commit themselves to reduction targets when they had historically not contributed to global greenhouse gas stocks, nor benefited from such emissions in the form of elevated standards of living. Thus, in order to reach a comprehensive

international agreement that brought all the necessary players to the table, the first COP used the principle of CDR to strike a political compromise with continuing legal implications.”³⁷⁴ However, it is not enough to rely on political compromise. We need to provide a deeper legal philosophy basis to guide countries to perform their international obligations more actively after the Paris Agreement is reached. It will also promote the implementation of the provisions on dealing with loss and damage in the Paris Agreement.

3.2.3 Philosophical roots for the principle

The United Nations Framework Convention on Climate Change has established the principle of “common but differentiated responsibilities”, but the legal and ethical basis of the principle is ambiguous. As a result, different interpretations have been drawn from it. For example, the developed countries place more emphases on “common”, while the developing ones put more stresses on the word of “differentiated”. Although the Kyoto Protocol, which aims to implement the United Nations Framework Convention on Climate Change, has set up specific emission reduction targets for the period of 2008-2012, it is only a result of negotiations between all parties in accordance with their own interests and circumstances, not based on any specific reason. On the other hand, in the field of academic research, some studies are mainly devoted to putting forward various just emission reduction plans, but rarely focus on building up a just consensus to support these plans. For example, some scholars regard equal emission

³⁷⁴ Mary J Bortscheller, “Equitable but Ineffective: How the Principle of Common but Differentiated Responsibilities Hobbles the Global Fight against Climate Change” (2010) 10 Sustain Dev Pol 49 at 50.
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per capita as a principle of justice, and many claims also describe how to implement the principle of per capita emission reduction in detail; but there are only few preliminary understandings and simple analyses on why to take the principle of per capita as the basis of just emission reduction. Generally, a sufficient theoretical discussion is lacked. If a strong consensus can't be reached on the fundamental issue of the legal or ethical basis, no matter what kind of emission reduction plan is chosen, it will be considered as a political and expedient one, difficult to become the basis for promoting the continuous emission reduction by all countries. Therefore, what is needed is not a new or esoteric philosophical, political or legal theory, but how to apply certain relatively familiar ideas in the special circumstances of climate change.

“International distributive justice”. International distributive justice is developed from Rawls's theory of justice. Although it has been controversial and questioned, it can explain many problems as a political theory and provide a theoretical basis for these problems. Perhaps we can use it to explain the rationality of “common but differentiated responsibility principle”. “The principles of justice seeing to the prerequisites for happiness are as follows: First principle: Each person is to have an equal right to the most extensive total system of equal basic liberties compatible with a similar system of liberty for all. Second principle: Social and economic inequalities are to be arranged so that they are both: (a) to the greatest benefit of the least advantaged, consistent with the just savings principle, and (b) attached to offices and positions open to all under conditions of fair equality of opportunity.”³⁷⁵

³⁷⁵ Otfried Höffe, *John Rawls: a theory of justice*, Ebook Central (Leiden ; Boston: Brill, 2013) at 7.
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The first principle pertains to civil and political rights, the second to material and non-material interests. Together the two principles result in a liberal and social constitutional state, so in a constitutional democracy which first includes a competitive economy (market economy) and which secondly also wants to do justice to future generations.³⁷⁶ In accordance with the first principle, that of the most extensive equal basic liberties, the in part civil, in part political basic as well as human rights are equal for all. According to the second principle, they are however only acceptable within an economic or social sphere, though also there they cannot be used for rewarding natural assets of a physical, psychological or intellectual nature with a higher social prestige and a greater share of material goods.³⁷⁷ Rawls definitely gives priority to the first principle. Because liberty is absolutely in the best interests of mankind. In any case, to balance any constraint of basic rights against individual or collective economic advantages is unfair. However, Rawls did not raise his theory of justice as an international theory. The theory of justice mainly describes a domestic society and has little discussion about relations between countries.

However, Charles Beitz used Rawls's theory to propose an international distribution justice about natural resources. He believes that the parties under the international original position know that the natural resources on the surface of the earth are unevenly distributed. Compared with natural talents, the distribution of natural resources around the world is morally more accidental. Therefore, the parties in the international original state will treat the distribution of resources in the same way as the

³⁷⁶ *Ibid.*

³⁷⁷ *Ibid at 23.*

natural talents in the original state of Rawls's theory of justice. Charles Beitz believes that the two principles of Rawls can be applied to international distribution justice by appropriate reinterpretation. He considered that the subject of international distributive justice is complex, but the philosophical idea that motivates concern about it is simple. The most fundamental requirement of any system of political morality, whether domestic or international, is that institutions should respect the equal moral standing or, one might say, the equal moral worth of everyone whom they affect. This is not the same thing as a requirement of equal treatment, because there are circumstances in which persons can, with justice, be treated unequally. Equal respect is the weaker requirement that differences in how persons are treated should be justifiable in terms of morally relevant differences in their situations.³⁷⁸

Meanwhile, Charles Beitz considered international distribution justice was one of the elements of international liberalism. He considered the international liberalism has four elements: "(1) a conception of the moral foundations of principles of international conduct; (2) an account of international political justice, including the prerogatives of the state, the authority of international law and institutions, and the minimum requirements of fair participation in international governance; and (3) an account of distributive justice, including the distributive responsibilities of states and the extent, if any, to which the institutional structure of international order should seek to influence the global distribution of resources and wealth. Together these elements should, in turn, form the basis of (4) a doctrine of human rights, understood as universal minimum

³⁷⁸ Charles R Beitz, "Recent international thought" (1988) 43 Intl J 183 at 191.

standards of legitimacy for social institutions.”³⁷⁹

He concentrated on the international distributive justice and he thought the doctrine of human rights was its consequences. So he established the relationship between international distributive justice and human rights. “He said that any plausible form of international liberalism should include an interpretation of the doctrine of human rights. Human rights today serve as terms of reference for foreign policy in many of the liberal democracies; as normative standards for policy in international financial and development institutions; and as a basis of appeal for international or supranational intercession in cases of otherwise irresolvable domestic dispute. In all of these respects human rights play what might be called an institutional role; that is, they operate as standards to be applied both by and to domestic and international institutions.”³⁸⁰ In addition, it is important that human rights play another role in international life. They form the basis for a series of non-governmental organizations to criticize and monitor government actions, which may affect the way countries implement their international obligations or the domestic political culture. John Rawls’s Theory of Justice raises two well-known principles: everyone has the broadest equality and fundamental freedoms, so everyone should have an equal right; when social and economic inequalities the society can adhere to the principle of difference, but it can protect the interests of all people under the conditions of fair and equal opportunities.

³⁷⁹ Charles Beitz, “International Liberalism and Distributive Justice: A Survey of Recent Thought” (1999) Vol. 51:No. 2 World Politics 269 at 270.

³⁸⁰ *Ibid* at 295.

In fact, these two principles reflect the concerns of person. And Charles Beitz's connection of international distributive justice with human rights is also a concern for person. In fact, Rawls began to disapprove of his theory of justice as an international theory. The theory of justice mainly describes a domestic society and has little to do with relations between countries. Regarding the international distributive justice theory, it is not Charles Beitz's unreasonable "kidnapping" of Rawls's theory of justice, but the development of Rawls's point of view through the concern of person.

What we need to understand is John Rawls did not care completely about international distributive justice. "The Law of Peoples" represents a fascinating, original, and possibly surprising elaboration of the brief remarks on international justice in Rawls's earlier work.³⁸¹ At this time, the principle of justice listed by Rawls is different from the two principles in the theory of justice. At this time, they seem more like an endorsement of the basic principles of existing international treaties. The law of peoples divides into ideal and non-ideal theory. Ideal theory consists of principles that apply to an idealized world political society of well-ordered domestic societies in which the principles are fully complied with and in which all societies operate in background conditions that favor just (or decent hierarchical) institutions.³⁸² These principles of ideal theory apply to conduct in the non-ideal world in two ways: by regulating relations among well-ordered liberal and hierarchical societies and by establishing goals for these societies to pursue in their relations with societies that are not well ordered. In particular,

³⁸¹ Charles Beitz, "International Liberalism and Distributive Justice: A Survey of Recent Thought" (1999) Vol. 51:No. 2 World Politics 269 at 273.

³⁸² *Ibid* at 274.

each society now burdened by unfavorable conditions should be raised to, or assisted toward, conditions that make a well-ordered society possible. This requirement is the source of the international distributive obligations of well-to-do societies: they must do what they can to assist societies facing unfavorable conditions to develop institutions capable of satisfying their own peoples' human rights and meeting their basic needs.³⁸³

Ideal theory apply to conduct in the non-ideal world to regulate the well-ordered societies and the not well-ordered ones. The rich countries must do what they can to assist societies facing unfavorable conditions to satisfy their own peoples' basic needs. That is to say, Rawls is turning the theoretical focus to dealing with the relationship between countries, he has already mentioned the assistance between countries. Rawls's theory of the law of peoples is an important advance over his brief remarks on international justice in *A Theory of Justice*, particularly in its recognition of duties of assistance that require a significantly higher level of international transfers than those that take place today. However, these duties are not consequences of any principle of justice.³⁸⁴ "International distributive justice" comes from Rawls' justice theory, which can solve many international political problems. On the issue of common but differentiated responsibilities, this theory also provides an idea. In the international community, all countries should receive equal treatment and share responsibilities equally. At the same time, the theory also provides a reasonable theory for international assistance. In a word, justice provides a reasonable basis for the principle of common but differentiated responsibility. The following will be discussed from the perspective

³⁸³ *Ibid* at 275.

³⁸⁴ *Ibid* at 276.

of fairness.

“Iure naturae aequum est neminem cum alterius detrimento et iniuria fieri locupletiolem”. Many of the doctrines of the ancient Roman jurist Pomponius were later absorbed by Justinian’s “the Digest”. He proposed that “according to natural law, anyone who is rich by causing loss or damage to others is unfair (iure naturae aequum est neminem cum alterius detrimento et iniuria fieri locupletiolem)” is also included. This maxim embodies the importance and respect of the Roman law to the natural law. The natural law provides theoretical guidance for the Roman law, and the Roman law can make up for its various shortcomings and gradually improve. The idea of Roman natural law originated from ancient Greece.

To Cicero, law is the highest reason, implanted in nature, which commands what ought to be done and forbids the opposite. The very root and origin of the law is in nature or, as he also puts it, in God. For the mind of God cannot exist without reason, and divine reason cannot but have this power to establish right and wrong. God, therefore, is the inventor, interpreter and sponsor of natural law. The Gods have given it to the human race. It is the supreme law, the only true law and genuine justice. In fact, justice does not exist at all, if it does not come from nature or right reason.³⁸⁵ Cicero believes that following nature and living according to natural law means that as long as people themselves acquire the things they want according to natural requirements, this must be the most legal and most beautiful way of life. The thoughts of ancient Roman

³⁸⁵ Levy E, “Natural Law in the Roman Period” (1949) 2 NAT INST PROC at 45.

jurists are deeply influenced by the “Stoic school of philosophy”. To live according to reason is to live according to nature. Regarding the role of nature, Aldo Leopold believes that air, soil, water, plants, animals, and humans are all part of the community of life. In this community of life, each member has its right to continue to exist, and at least in some respects, they can continue to exist in the natural state.³⁸⁶

Pomponius evaluates fairness and justice on the premise of natural law. It is a concentrated expression of the combination of nature and law. In the natural state, human beings should respect each other’s rights to survival and development. From the perspective of the state, each country has an obligation to respect others’ right of the country to survive and develop. No country has the right to decide which countries share resources on Earth or which countries do not share resources on Earth. Any country has the right to continue to exist and make rational use of natural resources. Although the loss and damage caused by climate change has not become a serious problem at the beginning of this motto, which reflects the principles of natural law. The principles of legal philosophy it describes can be applied to the new problems in today’s world, namely the loss and damage caused by climate change. As a public object, air resources belong to all human beings and are not exclusive to any country or individual. The greenhouse gas emissions of countries are exploiting this public resource and are the rights of each country. Due to the protection of public resources and respect for the interests of other countries, each country cannot use air resources to cause nuisance to other countries. If it causes nuisance, it must take restrictions or even prohibit measures.

³⁸⁶ Aldo Leopold, *a Sand County Almanac* (New York: Oxford University Press, 1966) at 219.

The development of industry and science and technology in developed countries is much earlier than that in developing countries. Greenhouse gas emissions affect the global climate. Climate change has caused loss and damage to some countries, especially small island countries and developing countries that are vulnerable to the adverse effects of climate change. However, developed countries have benefited from such greenhouse gas emissions that have a severe impact on the global climate, a fact that benefits from the loss and damage of other countries is extremely unfair. Although the above-mentioned responsibility for loss and damage caused by climate change is all countries, developed countries have historical responsibility for such loss and damage, and developed countries bear primary responsibility for early greenhouse gas emissions. The principle was put forward at the beginning of fairness and justice. It is reasonable to try to analyze the theoretical basis of the principle from “international distributed justice” and “pomponius legal proverb”. However, with the complexity of the issue of climate change, it is not enough to simply consider fairness and justice and the historical emission responsibility of developed countries, and this principle will be gradually given a new meaning. It will be discussed in detail below.

3.3 The common but differentiated responsibility principle in climate change law

The principle makes developed countries the first actors in reducing emissions, and allows developing countries to follow over time. The notion of common but differentiated responsibilities is not new: it reflects general principles of equity in international law. The principle was present in nascent form in the 1987 Montreal

Protocol, which acknowledged the “special situation” of developing countries by allowing them to delay their compliance with Protocol control measures for ten years. The UNFCCC has attempted to duplicate this successful model in a climate change context.³⁸⁷

3.3.1 The proposition of the climate change treaties

Warsaw international mechanism for loss and damage associated with climate change impacts will enhance action and support, including finance, technology and capacity building, to address loss and damage associated with the adverse effects of climate change, so as to enable countries to undertake actions, including by:

“(i) Providing technical support and guidance on approaches to address loss and damage associated with climate change impacts, including extreme events and slow onset events; (ii) Providing information and recommendations for consideration by the Conference of the Parties when providing guidance relevant to reducing the risks of loss and damage and, where necessary, addressing loss and damage, including to the operating entities of the financial mechanism of the Convention, as appropriate; (iii) Facilitating the mobilization and securing of expertise, and enhancement of support, including finance, technology and capacity-building, to strengthen existing approaches and, where necessary, facilitate the development and implementation of additional approaches to address loss and damage associated with climate change impacts, including extreme weather events and slow onset events.”

In the Preamble of UNFCCC, it considers:

“The global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, in accordance with their common but differentiated responsibilities and respective capabilities and their social and economic conditions.”

³⁸⁷ Mary J. Bortscheller, *supra* note 374.

In the Kyoto Protocol, it provides all Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, without introducing any new commitments for Parties not included in Annex I, but reaffirming existing commitments under the Convention should: Develop cost-effective country programs where relevant and to the extent possible; Develop, implement, publish and regularly update measures that contain climate change mitigation and contribute to adequate programs of countries that are subject to climate change measures; Enhance the cooperation to promote effective ways to develop, apply and disseminate technologies related to climate change; Enhance the cooperation at the international level and facilitate the development and implementation of education and training.

In the Preamble to the Paris Agreement, it provides:

“The Parties to Paris Agreement, in pursuit of the objective of the Convention, and being guided by its principles, including the principle of equity and common but differentiated responsibilities and respective capabilities, in the light of different national circumstances have agreed obligations under the agreement.”

Before the formation of the Paris Agreement, the parties to UNFCCC gave their views on the new agreement to be included in 2015. “A number of developing countries from the Like-Minded Developing Countries (LMDC), which includes Bolivia, China, Cuba, Dominica, Ecuador, Egypt, El Salvador, India, Iran, Iraq, Malaysia, Mali, Nicaragua, the Philippines, Saudi Arabia, Sri Lanka, Sudan, and Venezuela, emphasized the importance of the equity and CBDR principle and the continued

recognition of differentiation of the nature and level of obligations between developed and developing countries. Similar views were also expressed by the Alliance of Small Island States (AOSIS), which does not want a re-interpretation or re-writing of the Convention's principles, provisions and annexes. The LDCs also stressed the importance of the principle of CBDR."³⁸⁸

Developed countries stress the need for the new agreement to allow for mitigation commitments that reflect 'fairness' and "fair shares", with the European Union also referring to the need for "equity". The developed countries do not want categorization of countries to be Annex 1 and non-Annex 1 or a developed–developing country "binary approach" or "two-room approach". They stress the need for a "dynamic" approach to the principle of CBDR. Hence, they are opposed to a differentiation in obligations based on a developed–developing country binary but are for differentiation based on type and scale of efforts among countries.³⁸⁹

It is obvious that both developing and developed countries recognize the status of CBDR in the new agreement. Developing countries believe that CBDR is applicable to mitigation and adaptation, and mitigation is in the context of UNFCCC. For example, China considered "post-2020 enhanced actions are to comprehensively implement the provisions of the Convention covering limitation, adaptation, finance, technology development and transfer and capacity building. Adaptation actions shall be further

³⁸⁸ *Different views of countries on workstream 1 of Durban Platform*, by Meena Raman (Bonn, 2013).

³⁸⁹ *Ibid.*

enhanced with support.”³⁹⁰ Developed countries do not deny that CBDR is applicable to mitigation and adaptation, but put forward their own views. The developed country didn’t refer to the historical responsibility of developed countries for contributing the global emissions of greenhouse gases. The developed countries emphasize the need for a spectrum of commitments for mitigation from all countries and for a common accounting, transparency and review system in the new agreement.

It can be seen that developed countries and developing countries have a recognition attitude towards CBDR, which can not only guide the Parties to fulfill their mitigation obligations, but also guide them to fulfill their adaptation obligations. However, developing countries believe that the implementation of mitigation obligations should follow the UNFCCC to distinguish Annex I countries from non-Annex I countries, and the historical responsibilities of developed countries should not be ignored. Developed countries are opposed to this approach, believing that all countries should commit themselves to the implementation of mitigation obligations.

3.3.2 The principle for mitigation obligations

The discussion on “developing country” and “developed country”. The United Nations Framework Convention on Climate Change clarifies that developed countries should bear the responsibility of taking the lead in reducing emissions and providing financial technical support to developing countries. Annex I country Parties (developed

³⁹⁰ *Ibid.*

countries and countries with economies in transition) should take the lead in reducing emissions. Annex II countries (developed countries) should provide developing countries with funds and technology to help developing countries cope with climate change. The United Nations Framework Convention on Climate Change recognizes the priority needs of developing countries to eradicate poverty and develop the economy. The UNFCCC recognizes that per capita emissions in developing countries are still relatively low, so the share of global emissions will increase, and economic and social development and poverty eradication are priorities for developing countries.³⁹¹ With regard to the mitigation obligations, the Convention divides Annex I countries, Annex II countries and non-Annex I countries, and actually uses the concepts of developed and developing countries directly. The Convention does not provide a clear answer regarding the criteria for the classification of “developing country” and the “developed country”. The designations of “developed” and “developing” are intended for statistical convenience and do not necessarily express a judgement about the stage reached by a particular country or area in the development process.³⁹² The Kyoto Protocol stipulates that Annex I countries should reduce their total annual greenhouse gas emissions by at least 5% from 1990 to 2008.³⁹³ At the same time, developed countries can adopt the three “flexible compliance mechanisms” of “emissions trade”, “joint implementation” and “clean development mechanism” as complementary means to complete emission reduction obligations.

³⁹¹ See United Nations Framework Convention on Climate Change, 4 June 1992, UNTS, (entered into force 21 March 1994), online: <https://unfccc.int/resource/docs/convkp/conveng.pdf>.

³⁹² See “UNSD — Methodology”, online: Standard country or area codes for statistical use (M49) <<https://unstats.un.org/unsd/methodology/m49/>>.

³⁹³ See Kyoto Protocol, December 1997, UNTS, (entered into force 16 February 2005), online: <https://unfccc.int/resource/docs/convkp/kpeng.pdf>.

Unlike the Kyoto Protocol with its two-tiered, commitment-or-not approach, the Copenhagen Accord of 2009 sets up a three-tiered system for assigning responsibility to cut emissions. These tiers are: developed countries with quantified targets; developing countries who “will” take some action; and LDCs and SIDS, who “may” take action, contingent upon funding from the international community.³⁹⁴ It provides that “Annex I Parties that are Party to the Kyoto Protocol will thereby further strengthen the emissions reductions initiated by the Kyoto Protocol. Non-Annex I Parties to the Convention will implement mitigation actions. Least developed countries and Small Island developing States may undertake actions voluntarily and on the basis of support.”³⁹⁵ Although the actualized emission reductions resulting from these three tiers of responsibility remains uncertain, in the long term the new three-tiered architecture reveal itself to be one of the most significant political outcomes of the Copenhagen negotiations.³⁹⁶

Copenhagen accord of 2009 divides the country into three types, and specifically refers to the emission reduction tasks of the least developed countries and Small Island developing States. “The detailed provisions of LDCs need to refer to the Committee for development policy (CDP) standard. The Committee for Development Policy (CDP), a subsidiary body of the UN Economic and Social Council, is – inter alia – mandated to review the category of LDCs every three years and monitor their progress after graduation from the category. The identification of LDCs is currently based on three

³⁹⁴ Douglas Bushey & Sikina Jinnah, “Evolving Responsibility -The Principle of Common but Differentiated Responsibility in the UNFCCC” (2010) 6 Publicist 1 at 5.

³⁹⁵ *Supra* note 220.

³⁹⁶ Douglas Bushey & Sikina Jinnah, *supra* note 394.

criteria: per capita gross national income (GNI), human assets and economic vulnerability to external shocks. The latter two are measured by two indices of structural impediments, namely the human assets index and the economic vulnerability index: 1. Income criterion, based on a three-year average estimate of GNI per capita for the period 2011-2013, based on the World Bank Atlas method (under \$1,025 for inclusion, above \$ 1,230 for graduation as applied in the 2018 triennial review). 2. Human Assets Index (HAI) based on indicators of: (a) nutrition: percentage of population undernourished; (b) health: mortality rate for children aged five years or under; (c) education: the gross secondary school enrolment ratio; and (d) adult literacy rate. 3. Economic Vulnerability Index (EVI) based on indicators of: (a) population size; (b) remoteness; (c) merchandise export concentration; (d) share of agriculture, forestry and fisheries; (e) share of population in low elevated coastal zones; (f) instability of exports of goods and services; (g) victims of natural disasters; and (h) instability of agricultural production. In the review process, the Committee determines threshold levels on each of the three criteria to identify the countries to be added to or graduated from the category. The thresholds for graduation are higher than for inclusion. In the identification process, the HAI and EVI thresholds are fixed by the Committee.”³⁹⁷

It can be seen that the main purpose of distinguishing between developing and developed countries is for statistics, and there is no international convention that regulates their concepts or distinguishing standards. Therefore, it is unreasonable to use the two concepts in the international conventions on climate change, which may cause

³⁹⁷ See “Criteria for Identification and Graduation of LDCs”, online: UN-OHRLLS <http://unohrlls.org/about-ldcs/criteria-for-ldcs/>).

the subject of international obligations to be unclear. While the Copenhagen accord of 2009 surmounted some important political barriers with respect to issues such as articulating a shared vision, the most important responsibility related movements occurred with regard to: “(1) differentiation of developing countries; (2) measurement, reporting, and verification (MRV) of nationally appropriate mitigation actions (NAMAs); and (3) articulating clear goals for finance. Although the Accord is not the legally binding agreement many had hoped for, it is nonetheless an important landmark in the history of the regime. Specifically, the Accord represents the next significant step after Bali in reshaping the principle of CDR within the regime.”³⁹⁸ In general, the provisions of Copenhagen Accord for “developing countries” and “developed countries” are more significant for undertaking of the common but differentiated responsibilities. Developing countries are the majority of the world and also the areas which need development. Development issues and increasingly critical global issues are most concentrated and prominent. Although some developing countries have achieved rapid development, this situation has not changed the serious gaps between the countries in terms of material wealth, development level, technological level and international status.

Although China’s economic aggregate and international status have been significantly improved, it is still a developing country. Moreover, China also has its own unique understanding and cognition of the concept of “developing countries.” According to China’s argument, “developing country” is not a purely economic concept from the beginning, but a political, social and cultural concept. In addition to

³⁹⁸ Douglas Bushey & Sikina Jinnah, *supra* note 394.

maintaining the stability of the existing international order, China also has the responsibility to promote the reform of the international order and the realization of international justice, so as to create a fair and just international environment for the developing countries. Even within quite a long time in the future, the developing countries will still be China's main arena for fulfilling its responsibilities as a major power. As a developing country, China's pressing task is still to solve the domestic economic and social problems which are urgent. At the same time, China's GHG emissions are still increasing, so China also has the responsibility to cope with the climate change. In considering and fulfilling China's international responsibility, China should take actions based on its own condition.

In brief, developed countries do not want to classify countries into Annex I and non-Annex I, but developing countries hold that the implementation of mitigation obligations should follow the provisions of the UNFCCC and distinguish the Annex I and non-Annex I countries. At first, the historical responsibility of developed countries cannot be ignored; but now, the international community should no longer emphasize the historical responsibility of developed countries. Based on the above differences, the discussion on these two concepts does not relate to how the international community is divided into different camps to deal with climate change, because this discussion is not just to highlight the differences between the two. The significance of discussing these two concepts lies in how to allocate the obligations and responsibilities.

From MRV to NDCs. The Bali Action Plan introduced language on “measurable, reportable and verifiable” greenhouse gas (GHG) mitigation actions and commitments, as well as support for GHG mitigation actions in developing countries. In the report of Bali Action Plan, it says that “the Conference of Parties should enhance the national/international action on mitigation of climate change, including, inter alia, consideration of: (i) Measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, by all developed country Parties, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances; (ii) Nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner.”³⁹⁹

“Annex I Parties that are Party to the Kyoto Protocol will thereby further strengthen the emissions reductions initiated by the Kyoto Protocol. Delivery of reductions and financing by developed countries will be measured, reported and verified in accordance with existing and any further guidelines adopted by the Conference of the Parties, and will ensure that accounting of such targets and finance is rigorous, robust and transparent.”⁴⁰⁰ Mitigation actions taken by Non-Annex I Parties will be subject to their domestic measurement, reporting and verification the result of which will be reported through their national communications every two years. Non-Annex I Parties will communicate information on the implementation of their

³⁹⁹ *Supra* note 212.

⁴⁰⁰ *Supra* note 213.

actions through National Communications, with provisions for international consultations and analysis under clearly defined guidelines that will ensure that national sovereignty is respected.⁴⁰¹ Developed countries, interested in independent verification of developing country mitigation actions, were pushing for international MRV. Conversely, many developing countries, citing sovereignty concerns, resisted this position, calling instead for domestic MRV, which could subsequently be shared with the UNFCCC via national communications.⁴⁰²

The requirements for measurement, reporting and verification (MRV) of nationally appropriate mitigation actions (NAMAs) are one of the crucial topics concerning the agenda of international negotiations to address climate change mitigation measures. For developing countries, mitigation actions need to be developed in a bottom-up manner, so as to achieve reductions relative to the baseline emissions. And they are supported by technology and finance. On the other hand, developed countries need to provide technology, financing and capacity-building in a MRV manner, so that developing countries can take national mitigation actions. In fact, MRV still endorse the principle of common but differentiated responsibilities. However, developing countries have a concern about national sovereignty, because they believe that the verification of information and data will pose a threat to their national sovereignty. This concern is also the main reason why MRV is controversial.

The Paris Agreement emphasizes the identity of the obligations of all the Parties

⁴⁰¹ *Supra* note 205.

⁴⁰² Douglas Bushey & Sikina Jinnah, *supra* note 394.

and no longer stresses whether a country is a developed or a developing country. This Agreement also requests each country to outline and communicate their post-2020 climate actions, known as their NDCs, which involve the emission reduction commitment and voluntary information notification by most countries. They are independent and voluntary in the verification of emission reduction information. Unlike MRV, NDCS does not involve any threat to sovereignty.

3.3.3 The prospect of the principle on adaptation obligations

Prevention of dangerous interference is specified as the “ultimate objective” of the UNFCCC (Article 2).⁴⁰³ In this regard, it is important to reduce the overall impact of climate change through adaptation. The implementation of the obligation of adaptation requires measures at all levels. If some countries fail to fulfill their international obligations, they need support at the international level.

Adaptation is therefore defined as “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities”. It involves adjustments to decrease the vulnerability of communities, regions and nations to climate variability and change, and to promote sustainable development. To be most effective, adaptation must proceed at different levels simultaneously. Adaptation is in fundamental ways inherently “local” (the direct impacts of climate change are felt locally) and response measures must be

⁴⁰³ A Saleem Khan, “Adaptation Policy Road Map Appraisal” 2012 42 *Envtl Pol* 312 at 312.

tailored to local circumstances. However, for these efforts to be robust, they must be guided and supported by national policies and strategies. For some countries, these, in turn, need to be facilitated through international measures.⁴⁰⁴

In current international climate change negotiations, there are proposals for introducing further levels of differentiation between states: not just between developed and developing parties but also between states: not just between least developed countries and major developing countries, the capacities of all countries, and the principle of ‘common but differentiated’ responsibility has also resulted in the establishment of special institutional mechanism to provide financial, technology and other technical assistance to developing countries to help them implement the obligations of particular treaties.⁴⁰⁵

Shaping future adaptation governance: perspectives from the poorest countries. Adaptation and mitigation alone cannot avoid all the impacts of climate change; however, they can complement each other and together significantly reduce the risks of climate change. In the short and long term, adaptation is necessary to cope with the effects of warming. There are barriers, constraints and costs, but these are not fully understood. In the long run, climate change is likely to exceed the adaptive capacity of the human system. The time of this will vary by industry and region. In the report of IPCC, it considers that “there are sharp differences across regions and those in the

⁴⁰⁴ A Saleem Khan, “Adaptation Policy Road Map Appraisal” 2012 42 *Envtl Pol* 312 at 312.

⁴⁰⁵ Philippe Sands, *Principles of international environmental law*, 3rd ed. (Cambridge ; New York: Cambridge University Press, 2012) at 236. See also Rajamani Lavanya, “Differentiation in the Emerging Climate Regime” (2013) 14 *Theor Inq* 151 at 152.

weakest economic position are often the most vulnerable to climate change. There is increasing evidence of greater vulnerability of specific groups such as the poor and elderly not only in developing but also in developed countries. Moreover, there is increased evidence that low-latitude and less developed areas generally face greater risk, for example in dry areas and megadeltas.”⁴⁰⁶

By the concept of the poorest of the poor, we refer to a fraction of the poor who are vulnerable to climate change and at the same time unable to benefit from a particular action aimed at reducing vulnerability and securing or improve their livelihoods. The reasons for their inability may vary from context to context. The fact that climate change is expected to severely harm the poorest of the poor, who are by definition notoriously difficult to reach, implies that climate change policy has a special responsibility to seek new ways of assisting the poorest of the poor to overcome destitution and deprivation.⁴⁰⁷ The concept of the poorest of poor is an analytical tool for understanding the difficulties of reaching certain groups of people in any society, not only in developing regions. And the report of IPCC is also saying that “the poor and elderly not only in developing but also in developed countries”.

When adopting adaptation measures, developing countries, if they have the capacity, should also assist people in poor countries and regions in need. For example,

⁴⁰⁶ The Core Writing Team, Reisinger Pachauri and Andy Reisinger & Intergovernmental Panel on Climate Change, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, (New York: UNEP, 2007) at 19.

⁴⁰⁷ Frank Biermann, Philipp H Pattberg & Fariborz Zelli, *Global climate governance beyond 2012: architecture, agency and adaptation* (Cambridge: Cambridge University Press, 2010) at 292, 293.

the China Meteorological Administration is developing global meteorological services and working hard to improve its capabilities of “global monitoring, global forecasting, and global services.” The China Meteorological Administration is willing to help African countries to improve their meteorological disaster prevention and mitigation capabilities. At present, China’s geostationary meteorological satellites represented by the Fengyun-2H star, as well as several “Fengyun” polar orbiting meteorological satellites, can monitor meteorological disasters in Africa in real time. In 2018, the China Meteorological Administration established a “Fengyun” satellite international user disaster prevention and mitigation emergency protection mechanism. According to the application of relevant countries, the “Fengyun” meteorological satellite can make high-frequency subregional observations and provide products to the affected areas. The China Meteorological Administration welcomes African countries to register as users of the emergency safeguard mechanism, and is willing to receive training from African weather forecasters to the International Training Center of the World Meteorological Center (Beijing) to improve the monitoring, forecasting and assessment of tropical cyclones in African countries. From 2013 to 2018, China provided meteorological project assistance to Comoros, Zimbabwe, Kenya, Namibia, Cameroon, Sudan, Congo, Guinea, etc. under the framework of the China-Africa Cooperation Forum to help African countries improve their weather service capabilities. In September 2018, the Beijing Summit the Seventh Ministerial Conference of the Forum on China-Africa Cooperation adopted the Forum on China-Africa Cooperation-Beijing Action Plan (2019-2021). One of the cooperation projects is: China is willing to continue to provide African countries with “Fengyun” meteorological satellite data and

products, as well as necessary technical support, continue to provide African countries with meteorological and remote sensing application facilities and education and training assistance, support the implementation of African meteorology (weather and climate services) strategies, and improve disaster prevention and mitigation in Africa and respond to climate change ability. The China Meteorological Administration will work with relevant departments to implement this project and continue to vigorously promote China-Africa meteorological cooperation.⁴⁰⁸

In fulfilling its international responsibilities, China needs to cooperate and coordinate with other countries and participate in the global governance process together. But in my opinion, China's assistance measures, such as "Fengyun" geometric satellite, are controversial. In fact, China's policy of international cooperation is well intentioned, but some measures will arouse suspicion from the international community. With regard to "Fengyun" meteorological satellite, I think China should carefully consider it, because even helping other countries without capacity to detect disasters also involves the national sovereignty of other countries. I think that national sovereignty is a sensitive issue, and the policy of international assistance should take into account the views of other countries.

Expand indigenous governance in climate change. The *United Nations Declaration on the Rights of Indigenous People (UNDRIP)* highlights many human rights standards that are legally binding. It is important to recognize that international

⁴⁰⁸ "China Climate Change Info-Net", online: <<http://en.ccchina.org.cn/>>.

norms and their application change over time-as does indigenous customary law.⁴⁰⁹ Many indigenous people live in fragile ecosystems and climate change is likely to affect their lands, resources, hunting and fishing activities, with subsequent impacts for economies, health and land rights. Indigenous peoples have largely been excluded from the international political discourses around climate change and the negotiations over responses to it. With Indigenous peoples representing 350 million people around the world, this exclusion is undemocratic.⁴¹⁰ International law is evolving, particularly in the human rights and indigenous rights sphere, and this needs to be fully reflected in climate change responses.

Research on indigenous environmental knowledge has been undertaken in many countries, often in the context of understanding local oral histories and cultural attachment to place.⁴¹¹ For example, the subsistence of indigenous civilizations in the Americas relied on the resources cropped under the prevailing climate conditions around their settlements. In the highlands of today's Latin America, one of the most critical limitations affecting development was, and currently is, the irregular distribution of water.⁴¹² This is due to the particularity of atmospheric processes and extreme conditions, rapid run off in deep valleys and changing soil conditions. Melting snow in the tropical Andes used to be, and still is, a reliable source of water. However,

⁴⁰⁹ Paul Martin et al, *The search for environmental justice*, paperback edition, The IUCN Academy of Environmental Law series (Cheltenham, UK: Edward Elgar Publishing, 2017) at 315.

⁴¹⁰ Second International Indigenous Forum on Climate Change, "Declaration of Indigenous Peoples on Climate Change" (2002) 7 Austl Indig Rep 97.

⁴¹¹ IPCC, 2007: *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Official Records (UK: IPCC, 2007) at 833.

⁴¹² *Ibid* at 864.

the water flows into the valley within the bounded watercourse and only brings the water to some places. In addition, there is little or no melting water in the valleys and hills outside the glaciers of the mountain ranges, in the snow covered areas and in the plateau areas. Therefore, on a large scale, human activities depend on seasonal rainfall. As a result, the pre-Colombian communities has developed a variety of adaptive actions to meet their needs. Today, although the scale may be different, the problem of achieving the necessary balance between water availability and demand is actually the same.

Under such limitations, from today's Mexico to northern Chile and Argentina, the pre-Colombian civilizations developed the necessary capacity to adapt to the local environmental conditions. "Such capacity involved their ability to solve some hydraulic problems and foresee climate variations and seasonal rain periods. On the engineering side, their developments included rainwater cropping, filtration and storage; the construction of surface and underground irrigation channels, including devices to measure the quantity of water stored. They also were able to interconnect river basins from the Pacific and Atlantic watersheds, in the Cumbe valley and in Cajamarca. Other capacities were developed to foresee climate variations and seasonal rain periods, to organize their sowing schedules and to program their yields. These efforts enabled the subsistence of communities which, at the peak of the Inca civilization, included some 10 million people in what is today Peru and Ecuador."⁴¹³ Nowadays, in the increasingly severe climate conditions, the increase of greenhouse effect and the rapid retreat of

⁴¹³ See *Ibid* at 864.

glaciers make the situation worse. It is very useful to re-examine and update such adaptation measures. Education and training of current community members in knowledge and technical competence will be the way forward.

The term ‘indigenous knowledge’ is used to describe the knowledge systems developed by a community as opposed to the scientific knowledge that is generally referred to as ‘modern’ knowledge. Indigenous knowledge is the basis for local-level decision-making in many rural communities. It has value not only for the culture in which it evolves, but also for scientists and planners striving to improve conditions in rural localities. Incorporating indigenous knowledge into climate change policies can lead to the development of effective adaptation strategies that are cost-effective, participatory and sustainable.⁴¹⁴ Understanding “indigenous knowledge” helps to deal with the special relationship between indigenous people and the environment. The unique relationships that indigenous people have with their environments mean that changes to these relations have implications for self-determination and sovereignty, resource use and economic security, health and recreation, culture and spirituality. Therefore, it is essential that negotiations over responses to global climate change account for those unique relationships and anticipate outcomes for indigenous peoples based on that understanding.

In the Sahel, “local farmers have developed several adaptation measures that have enabled them to reduce their vulnerability to climate variability and extremes. One

⁴¹⁴ *Ibid* at 865.

important step in reducing the vulnerability of a climatic hazard is the development of an early warning system for the prediction or forecast of the event. There is a wealth of local knowledge based on predicting weather and climate. A study of weather knowledge in various parts of the Sahel reveals the wealth of knowledge that farmers possess. These farmers have developed intricate systems of gathering, prediction, interpretation and decision-making in relation to weather.”⁴¹⁵ In order to integrate indigenous knowledge into formal climate change mitigation and adaptation studies, certain steps must be taken. The first step is to acknowledge that indigenous knowledge has provided communities with the capability of dealing with past and present vulnerabilities to climatic extremes and other stresses. Second, one must adopt the bottom–up participatory approach that encourages the highest level of local participation. Third, the local communities should be seen as equal partners in the development process. It is basically an internal process, which only may be enhanced by outside assistance. Local actors should progressively take the lead while external partners back their efforts to assume greater responsibility for their development. Reducing vulnerability entails the strengthening of adaptive capacities of vulnerable individuals and groups.⁴¹⁶

Under the adverse effects of climate change, poor people in developing countries (including least developed countries and small island States) have heavy burdens. The impact of these developing countries on climate change is far less than that of developed

⁴¹⁵ A Nyong & F Adesina & B Osman Elasha, “The value of indigenous knowledge in climate change mitigation and adaptation strategies in the African Sahel” (2007) 17 *Mitig Adapt Strat Glob Change* at 793.

⁴¹⁶ *Ibid* at 795.

countries, and the risks are concentrated in these poor countries, which is obviously unfair. Therefore, it is necessary to strengthen international cooperation to help these developing countries cope with the adverse effects of climate change. Therefore, in assisting these poor countries, aid projects need to integrate indigenous knowledge into formal climate change mitigation and adaptation studies. Projects need to recognize that indigenous knowledge has the capacity to provide local response to climate change loss and damage. Projects must be participatory from the bottom to up, encouraging the widest participation. At the same time, local communities and local organizations should be regarded as equal subjects to deal with climate change. Local governments and society organizations should gradually take the lead and external projects should support local efforts and provide more support for improving local adaptability.

In the context of dealing with the loss and damage caused by climate change, the Paris Agreement requires that parties take action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity. The Paris Agreement provides “to respect the rights of indigenous people”. It shows that the importance of indigenous knowledge has been gradually accepted by international conventions or agreements. These issues need to be taken into account when countries formulate international aid policies or domestic mitigation and adaptation policies. Therefore, countries should fulfill their international obligations to respect for

indigenous peoples and respect for the local cultural traditions and production methods.

The international conventions and agreements dealing with climate change initially stipulated Annex I countries and non-Annex I countries. Now the Paris Agreement stipulates that all countries should make emission reduction commitments, no longer distinguishing Annex I countries from non-Annex I countries. In the implementation of the adaptation obligation, according to the principle of respective capacity, each country should fulfill its adaptation obligation according to its own capacity, and at the same time, provide assistance to the poorest countries. In fact, the focus of the principle of common but differentiated responsibility has gradually changed from emphasizing the historical responsibility of developed countries to emphasizing the common responsibility of all countries. As mentioned above in “Philosophical roots for the principle”, this principle has given rise to new meanings. The Paris Agreement endorses a markedly different notion of differentiation under the CBDR principle from that of previous understandings. The rigid separation of developed and developing country obligations which characterized the Kyoto Protocol has been replaced with a commitment by all countries to develop and implement “nationally determined contributions” (NDCs) to the global climate change response.⁴¹⁷ Despite the diminished role for the CBDR principle in relation to prescriptive substantive mitigation commitments under the Paris Agreement, there is increasing scope for the CBDR principle to shape procedurally oriented implementation and

⁴¹⁷ Jacqueline Peel, “Re-evaluating the Principle of Common But Differentiated Responsibilities in Transnational Climate Change Law” (2016) 5 TEL 245 at 248. See also Harro van Asselt & Stefan Bossner, “The Shape of Things to Come: Global Climate Governance after Paris”, (2016) CCLR46.

support mechanisms under the Paris Agreement.⁴¹⁸ CBDR will continue to play a key role in adaptation, capital and technology transfer, capacity-building and compliance. Under the guidance of this principle, some countries need to help those countries that are unable to fulfill their obligations under the Paris Agreement. At the same time, the Paris agreement needs to specify what the consequences will be if some countries fail to fulfill their aid obligations. From here we see that, the implementation mechanism of the Paris Agreement is not perfect.

The “differentiated responsibility” in the Paris Agreement remains connected to the UNFCCC but contains new elements regarding progression over time. The Paris Agreement gives the concept a new ‘dynamic’ orientation. In UNFCCC and Kyoto Protocol, differentiated responsibility is a kind of “static differentiation”. Annex I countries are stipulated in the Kyoto Protocol, which determines that some developed countries fulfill their emission reduction obligations. The Kyoto Protocol has fixed this difference in the form of law. In the Paris Agreement, the scope of application of differentiated responsibility is expanded, which applies not only to mitigation obligations, but also to adaptation obligations. At the same time, it is also applicable to the performance of international obligations. Different countries can fulfill their international obligations according to their own capabilities, and countries with the ability can also assist countries with difficulties in fulfilling international obligations. This kind of differentiation is gradually moving towards the implementation of international obligations. This is a “dynamic differentiation”.

⁴¹⁸ Anna Huggins & Md saiful Karim, “Shifting Traction: Differential Treatment and Substantive and Procedural Regard in the International Climate Change Regime” (2016) 5 TEL 427 at 428.

The concept of “common responsibility” has been discussed in detail above, which embodies the common interests and the sovereign equality of all countries. All countries have equal rights and obligations as well as equal responsibilities. This concept is also the embodiment of the “principle of sovereign equality” in international law. Its effect is intended to promote all countries to actively undertake corresponding international responsibilities. Common but differentiated responsibility principle is the basic principle to deal with the loss and damage caused by climate change. It is different from other principles because it is based on the theory of fairness and justice, but its concept will be given new meaning. With the complexity of climate change, it will be gradually developed to adapt to the new situation.

Conclusion

Climate change affects human survival and development. It is a long-term challenge facing humankind. International climate change legislation and negotiations are gradually progressing. Both developed and developing countries need to take positive actions in international negotiations to address climate change. They should be responsible for the sustainable development of mankind. The adverse consequences caused by climate change pose a serious threat to all countries. Due to fragile ecosystems, weak infrastructure, and poor economic stability, small island nations have suffered particularly severe loss and damage under the impact of climate change. May be it is permanent and irreversible.⁴¹⁹

As early as in 1991, the Alliance of Small Island States had proposed addressing loss and damage caused by climate change. Since then, scholars and international organizations have also made many suggestions on how to deal with the loss and damage caused by climate change, but the definition of the loss and damage caused by climate change and the nature of the responsibility for loss and damage caused by climate change have not been unified. So it is necessary to summarize and study it, and then discuss the countermeasures. “Loss and damage caused by climate change” is not an empty political concept. It is a concept that needs to be comprehensively and accurately defined in the legal sense. Its emergence has promoted the formation of a new and special legal relationship.

⁴¹⁹ Michael B. Gerrard & Gregory E. Wannier, *supra* note 29.
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Seemingly, the loss and damage are caused by climate change, but actually, such loss and damage originate from human's greenhouse gas emissions. This means that in this new and special relationship between rights and obligations, some countries become the subject of rights due to loss and damage, and those countries, international organizations and individuals that emit greenhouse gases become the performers of the obligations or the sharers of responsibilities. Although the existence of loss and damage caused by climate change is already an indisputable fact, there are divergent opinions on the nature of definitions and responsibilities and the response measures, which have not yet been unified. The irrationality of compensation as a response has been discussed above.⁴²⁰

Moreover, the international community has noticed that the mitigation actions alone do not play a very effective role in addressing the loss and damage caused by climate change, so this study proposes that adaptation measures be the first response measures. Nevertheless, it is necessary to clearly define the loss and damage caused by climate change before discussing the countermeasures. After analyzing the relevant international conventions and documents of international conferences and the opinions of scholars, this study clarifies the meaning of such loss and damage in the following definition: the actual or potential adverse consequences, caused by greenhouse gas emission, which act on the life, health, property and environment. Such consequences

⁴²⁰ Compensation has been mentioned as a remedy for environmental damage. However, when dealing with the loss and damage caused by climate change, the determination of the subject of responsibility and the amount of compensation for damage is more complicated. So this method is not applicable.

threaten the survival and sustainable development of mankind, whether avoidable or unavoidable.

Given generally, the current view holds that the loss and damage caused by climate change are transboundary damage. However, after summarizing the characteristics of such loss and damage, this study concludes that they are not transboundary damage. Further, the responsibility for such loss and damage is not a responsibility for transboundary damage or for internationally wrongful acts.

Based on the causes of the loss and damage and the current status of international climate change negotiations, two suggestions are put forward for countermeasures. First, to establish new emission reduction targets. NDC made by major countries have set up the commitments to reducing greenhouse gas emissions, but most countries have not reached a consensus on the nature of NDC. Therefore, it is recommended that all countries strengthen their domestic legislations to grant a legal nature to the emission reduction targets, in order to enforce strong emission reduction actions and effectively fulfill their international obligations. Second, to improve the “Warsaw International Mechanism” by strengthening international cooperation and establishing an adaptation system. The functions of the Warsaw International Mechanism provide some ideas on how the international community could respond to climate change from an adaptation perspective.

To cope with the loss and damage caused by climate change, countries need to discharge their international obligations, and this process requires the legislative and administrative support of each country. The performance of both mitigation and adaptation obligations requires related countries to offer adequate financial and technical support. Funds and technologies have always been the focus of attention of the international community. As the previous climate change conferences have not been able to properly resolve financial and technical issues. For some countries, these, in turn, need to be facilitated through international measures. To meet this challenge, the following requirements are considered: information; capacity; technology; Institutions; financial resources.⁴²¹ Any effective strategies must be based on the best available information as well as the cost and effectiveness of possible response measures; the countries' priority shall be to strengthen the things most relevant to understanding potential climate impacts and developing response strategies. And the success in adapting to climate change depends in part on acquiring and developing suitable technologies that are tailored to the specific needs and circumstances of each country in certain areas. Such adaptation measures must be integrated between the existing institutions, establish focal points at the international level for providing expertise, and formulate and coordinate comprehensive strategies.

With regard to the fulfilment of obligations under international environmental treaties, all nations across the globe, in particular the developing countries, are bearing an increasingly high burden. The international community is now deliberately shifting

⁴²¹ A Saleem Khan, "Adaptation Policy Road Map Appraisal" 2012 42 *Env'tl Pol* 312 at 313.
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its focus from elaborating the international environmental treaties to ensuring and promoting the compliance and implementation of the existing treaties. To this end, non-compliance mechanism arises at the historic moment, as many international environmental treaties have established their own non-compliance mechanisms and procedures. In this respect, the Kyoto Protocol provides the fastest and most mature implementation mechanism of the international environmental treaties. In effect, the settlement of international disputes can be divided into political settlement and legal settlement. The former covers: negotiation and consultation; mediation; investigation; and reconciliation. And the latter mainly includes arbitration and judicial decision.⁴²² Another way to resolve the disputes arising from the fulfilment of obligations under international conventions is to report cases of non-compliance through an implementation mechanism. Given that the implementation mechanism of the Paris Agreement is not yet complete, it currently plays a role of monitoring the parties' obligations under international conventions or agreements, and the procedures have not yet been established for those countries failing to comply with international conventions to report their situations of non-compliance.

As is universally recognized, the Paris Agreement is based on equity and embodies the principle of common but differentiated responsibilities as well as respective capabilities, while emphasizing that it must be based on different national conditions. It refers to the specific needs and special circumstances of developing country Parties, particularly those that were particularly vulnerable to the adverse effects of climate

⁴²² Ma, *supra* note 279. See also Guimei Bai, *International Law* (Beijing: Peking University Press, 2015).

change, while taking full account of financing and technology transfer. Plus, it stipulates that all parties should respect, promote and consider the human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and vulnerable persons, the right to development and gender equality, and the empowerment and intergenerational equity. Moreover, it requires the parties not only to respect these rights, but also to implement this agreement; in addition, the parties must provide education, training, publicity, public participation and public access to information and cooperation on the matters covered by the agreement. Furthermore, it also recognizes the importance of governments and players at all levels in addressing climate issues in accordance with the respective national legislations of all parties. As far as the overall objectives of the Paris Agreement are concerned, on the one hand, it specifies respect for particularly vulnerable developing countries and full consideration of their difficulties and national circumstances in performing their obligations under the conventions or agreements. On the other hand, the Paris Agreement sets out the obligation of states to respect human rights and refers to the importance of domestic legislation to implement international conventions or agreements. While the Paris Agreement is purposed to drive states to fulfill their international obligations and implement international conventions or agreements, it has some deficiencies in how states comply with them and perform their international obligations.

Based on the current implementation mechanism established by the Paris Agreement, “a performance guarantee system needs to be established. In the current

climate change law, there has been a lack of economic penalties, so the climate change law system lacks enforcement. As such, a performance guarantee system can be established, that is, all parties should pay a certain amount of performance guarantee fund, which can be used to pay a penalty in case of default of a state party, thus ensuring universal adherence to and implementation of an international climate change convention or agreement.”⁴²³ Meanwhile, the status of the Executive Committee of the Warsaw International Mechanism on Loss and Damage related to climate change impacts should be established, and in fact, it was established at the Nineteenth Conference of the Parties. It operates under the direction of the Conference of the Parties to guide the implementation of the functions of the Warsaw International Mechanism. Each year, the Executive Committee of the Warsaw International Mechanism submits an implementation report to the Conference of the Parties on their fulfilment of the functions of the Warsaw International Mechanism, so as to monitor the implementation of the obligations under the Warsaw International Mechanism. In the future, it can provide guidance and assistance to states in their implementation of international obligations, and can act as a coordinating body to help and supervise parties in implementation of their international obligations.

Therefore, it is required that the international community to accelerate the climate change legislation process and improve the implementation of existing conventions to enhance the effectiveness of climate change law. For the sake of studying the

⁴²³ Mingde Cao, “China’s Legal Position and Strategy in Participating in International Climate Governance: From the Perspective of Climate Justice” (2016) 1 *China Legal Science* 29 at 41.

international law of dealing with climate change, some scholars hope to start from the dimension of unjust enrichment, find theoretical basis and conduct systematic discussion based on this research method.⁴²⁴ From the perspective of unjust enrichment, it is difficult for countries to reach an agreement, because the provisions on unjust enrichment are different. With a view to effectively dealing with climate change, attention should be paid to the existing international laws to analyze the rights and obligations stipulated under such laws as well as the existing international conventions and agreements. This seems more persuasive for further discussions on how to promote the fulfilment of international obligations by states. There is no doubt that to cope with the loss and damage caused by climate change requires all countries to fulfill their international obligations, and such fulfillment in turn requires the legislative and administrative support of all countries. With regard to the management of loss and damage due to climate change, the Paris Agreement does not propose more specific measures, but only reaffirms the role and function of the Warsaw International Mechanism. In order to ensure the performance of international obligations, the Paris Agreement proposes a new implementation mechanism, which is actually a kind of procedural supervision over the implementation of international conventions by states parties. Furthermore, addressing the loss and damage from climate change requires the international community to focus on and improve the existing adaptation rules, while providing certain monitoring and appropriate assistance to those countries with problems in their implementation.

⁴²⁴ See Aura Weinbaum, "Unjust Enrichment: An Alternative to Tort Law and Human Rights in the Climate Change Context" (2011) 20 Pac Rim Pol J 429 at 454.

Because the Paris Agreement does not propose more specific measures, this study chooses the Warsaw International Mechanism as the primary tool to explore the loss and damage caused by climate change. The main contents of the Warsaw International Mechanism include: risk assessment, information exchange, and immigration planning. Accordingly, this study conducts in-depth analysis and research from these three areas as the main measures to deal with such loss and damage. Broadly, these three measures can also be regarded as part of adaptation measures. The treatment of such loss and damage requires both mitigation and adaptation measures by all countries. This study finds that the adaptation measures are particularly important at present. Such loss and damage already exist, and are suffered by some countries in a particularly obvious manner. In the international community, some countries claim that the developed countries should compensate the countries that have suffered such loss and damage. However, this claim cannot be realized, because the formation of such loss and damage cannot be fully blamed on the developed countries; rather, other countries are also responsible. The countries that have suffered such loss and damage and the countries that are responsible for such loss and damage may be identical. Then how to make compensation? So this is difficult to resolve. The Paris Agreement once again proposes the principle of common but differentiated responsibilities. The subjects of the principle have not been strictly clarified, and the division of the concepts of developed countries and developing countries is not able to effectively help implement this principle. However, attention should be paid to the actual situation and the actual results by the international community, which can provide assistance for the countries and groups that need it most. Anyway, the international community shall not let the principle of

common but differentiated responsibilities lose its value and role, nor challenge its status.

At their core, the United Nations Framework Convention on Climate Change (UNFCCC) negotiations can be understood as a series of attempts to operationalize the international legal principle of “common but differentiated responsibilities.” The negotiations make clear that a global agreement to address the problem of climate change must necessarily apportion responsibility to act among diverse parties. The principle of common but differentiated responsibilities has guided the process of apportionment within the UNFCCC since its inception in 1992.⁴²⁵ Different understandings and interpretations of “common but differentiated responsibilities” have resulted in distinct designs for the international climate regime. Greenhouse gas emissions and the consequences of climate change have transformed the global welfare levels, leading to redistribution of climate costs and benefits among different groups and individuals; therefore, climate-related international negotiations shall involve fairness issues. Whether a plan can be accepted by policy makers and the public in various countries and finally become a realistic scheme for the international climate system through negotiation would mainly depend on two factors: (1) whether it lies on some solid fairness principles; and (2) whether it has strong operability and feasibility. The principle of “common but differentiated responsibilities” does not take the development of a country as the criterion of distinction, and the distinction between the concepts of developed and developing countries is also not clear, as mentioned above.

⁴²⁵ Douglas Bushey & Sikina Jinnah, “Evolving Responsibility -The Principle of Common but Differentiated Responsibility in the UNFCCC” (2010) 6 *Publicist* 1 at 1.

Further, the definition of these two concepts does not appear in any other international conventions or agreements. Also, the criteria used to distinguish different parties in the field of climate change are inconsistent with the levels of national development commonly understood. The principle of “common but differentiated responsibilities” does not have a universal understanding, but this situation should not become a reason for evasion of international responsibility. Given that the international community has not yet reached consensus on understanding of “common but differentiated responsibilities”, this principle cannot be expected to become a customary international law. As a direction of efforts, the international community shall continue to adhere to “common but differentiated responsibilities” and promote it as a specific principle in the field of international climate change.

The development of “common but differentiated responsibilities” as illustrated in this study is also reflected in the implementation of adaptation obligations. The focus on the indigenous peoples and the poorest countries is to break through the traditional distinction between developed and developing countries. This study hopes that the international community may pay more attention to human rights when it asks member states to fulfill their adaptation obligations. The ethics related to climate change is reflected in its impact on human rights and social justice, because climate change is not only an environmental issue, but also a matter of justice and human rights, as well as an issue dangerously intertwined with race and class. All colored people, indigenous people and low-income people across the world suffer most from the adverse effects of climate change. The risk of climate change also has serious impacts on some

particularly poor countries, since it is difficult for people in these countries to enjoy basic human rights fairly. In a word, international cooperation among countries should be strengthened to assist the countries stricken by climate change.

The contributions of this study are demonstrated in presenting certain specific suggestions on dealing with the loss and damage from climate change by the international community, while proposing reasonable advice on China's response to climate change. Further, this study points out that the three measures under the "Warsaw International Mechanism" should be improved and puts forward specific implementation plans. In the process of dealing with the loss and damage caused by climate change, countries should attach importance to the three major measures under the Warsaw International Mechanism. In the principle of "common but differentiated responsibilities" and concerning the obligation of mitigation and adaptation proposed in the Paris Agreement, this study suggests that China take effective legislative and administrative measures to fulfill its mitigation and adaptation obligations and deal with the loss and damage caused by climate change. Meanwhile, in terms of legislation, China should avoid declarative and principled provisions. And in terms of foreign policy, China should undertake the corresponding international assistance obligations, which need to be implemented according to its ability. The issue of international assistance involves international human rights and other related topics, which should be seriously considered by all countries when they fulfill their international obligations and assist other countries.

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