

Linda Schumacher

The Law of Coastal Adaptation

Insights from Germany and New
Zealand

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Abbreviations

BGH	Bundesgerichtshof (<i>Federal Supreme Court</i>)
Bremen	Freie Hansestadt Bremen (<i>Free Hanseatic City of Bremen</i>)
BVerfG	Bundesverfassungsgericht (<i>Federal Constitutional Court</i>)
BVerwG	Bundesverwaltungsgericht (<i>Federal Administrative Court</i>)
cl	Clause
CMA	Coastal marine area
EU	European Union
EUR	Euro
f	And the following page or paragraph
ff	And the following pages or paragraphs
Guidance Manual	Coastal Hazards and Climate Change: Guidance for Local Government
Hamburg	Freie und Hansestadt Hamburg (<i>Free and Hanseatic City of Hamburg</i>)
ICZM	Integrated coastal zone management
IPCC	Intergovernmental Panel on Climate Change
NZCPS	New Zealand Coastal Policy Statement
NZD	New Zealand dollar
OVG	Oberverwaltungsgericht (<i>Higher Administrative Court</i>)
RCP	Representative Concentration Pathway
RMA	Resource Management Act
RPS	Regional policy statement
s	Section
sch	Schedule
UK	United Kingdom
US	United States
VG	Verwaltungsgericht (<i>Administrative Court</i>)
VGH	Verwaltungsgerichtshof (<i>Higher Administrative Court</i>)

Chapter 1

Introduction



Not protecting cities such as Amsterdam, Rotterdam, and London during the 21st century is not an option. On the other hand, there are coastal areas such as small islands where protecting against several meters of sea level rise in the long term is not a viable option. Failing to mitigate, thus increasingly commits us to a world where densely populated areas lock into a trajectory of increasingly costly hard defenses and rising residual risks on the one hand and less densely populated areas being abandoned on the other hand.¹

1.1 Setting the Scene

1.1.1 *Climate Change in the Coastal Context*

This citation from the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) illustrates the severity of impacts, challenges, and far-reaching decisions that coastal communities around the world face in the light of a changing climate and rising sea levels. Every part of the world is expected to experience the impacts of climate change. The range of these predicted consequences is broad and includes increasing temperatures, heat waves, droughts, extreme precipitation, and rising sea levels.² Hence, climate change and its adverse effects are considered a “common concern of humankind.”³ Despite the recognition as a common concern, mitigation efforts are not on the top of the agendas around the world; in fact, emissions increased in 2017⁴ and 2018.⁵ Present efforts to reduce

¹Wong et al. (2014), p. 395.

²Field et al. (2014), p. 59 f.

³*United Nations Framework Convention on Climate Change: UNFCCC*, Preamble.

⁴International Energy Agency (2018), p. 3 f.

⁵Tollefson (2018), p. 2141.

greenhouse gas emissions are considered insufficient in speed and depth to meet the targets set by the Paris Agreement.⁶ Even if the 1.5 °C goal under the Paris Agreement⁷ is achieved, current research suggests that the consequences of climate change would already be disruptive under this scenario.⁸ Recent studies discovered evidence for anthropogenic influence on extreme temperature events and, although to a more limited extent, on extreme precipitation events like droughts and storms.⁹ Furthermore, other research has linked partial costs related to extreme weather events to climate change. For New Zealand, costs attributable to climate change were estimated at 840 million NZD¹⁰ for a 10-year period (2007–2017). However, the scope of the assessment was limited to privately insured damages due to extreme rainfall-related floods and economic losses associated with droughts. Thus, costs caused by climate change are likely much higher than the estimate.¹¹

Recent extreme events around the world may also have been exacerbated by climate change. For the year 2018 alone the list of extreme events includes: a heat wave in Europe,¹² the Hurricanes Florence and Michael at the US coast,¹³ the Super Typhoon Mangkhut in the Philippines and in China,¹⁴ and the heavy rain and flooding in Italy.¹⁵ These weather-related disasters claimed lives and caused massive destruction. Since such extreme events are likely to increase as a result of climate change,¹⁶ they are sometimes considered to be ‘a glimpse into the future’.

1.1.2 The Need for Coastal Adaptation

Both the inevitability of climate change and the severity of the potential impacts make climate change adaptation increasingly important. Sea level rise is almost certain and coastal areas already experience increasing coastal erosion and higher

⁶Climate Transparency (2017), pp. 6, 16 and 18.

⁷*Paris Agreement*, Art. 2 (1) (a). The provision sets the goal to holding the increase of global average temperature well below 2 °C above pre-industrial levels and to pursue efforts to limit the increase to 1.5 °C above pre-industrial levels. The latter is therefore already the more ambitious goal.

⁸See for coastal areas: Nicholls et al. (2018) and Brown et al. (2018). See also below: Sect. 2.1.

⁹Stott et al. (2016), especially pp. 23, 25 and 37; Baker et al. (2018), especially pp. 604 and 606.

¹⁰This equals around 467million EUR based on the exchange rate on 10 of April 2020 (1 NZD = 0.56 €).

¹¹New Zealand Climate Change Research Institute – Victoria University of Wellington and National Institute of Water & Atmospheric Research Ltd (2018), p. 17. The amount is split between 120 million NZD related to floods and 720 million NZD to droughts.

¹²BBC (2018).

¹³CNN (2018).

¹⁴The Washington Post (2018).

¹⁵The New York Times (2018).

¹⁶See below: Sect. 2.2.1.

storm surges.¹⁷ Traditionally, adaptation to coastal hazards mostly took place by protecting developed areas through hard defences,¹⁸ like the extensive dike line on the German and Dutch North Sea coast. Although coastal adaptation is nothing new, rising sea levels will question the economic or technical feasibility of coastal defences as illustrated by the introductory quote. Adapting to changes in sea level will, therefore, require coastal communities to consider and implement different strategies. This includes addressing the uncertainties of velocity and magnitude of sea level rise.

Adapting to rising sea levels will entail hard decisions. Controversial questions need to be answered: who should fund coastal defences? The coastal frontages? The coastal communities? The whole state? Even more controversial seems a decision to retreat from the coast by giving up land and existing coastal development since this displaces people. Despite its disruptiveness, the importance of retreat strategies increases. In some areas retreat may be the only adequate means to guarantee the safety of a community, protecting it from even more disruptive damage, e.g. through storm surge or coastal erosion.

Consequently, many coastal communities will face fundamental changes in the long-term. Decisions made today will shape the coast of tomorrow: either locking in unfavourable decisions or creating a resilient community able to cope with the impacts of rising sea levels. In addition, coastal adaptation can be a chance for other changes that improve the life quality of a city.

1.1.3 Adaptation in a Broader Sense

Adjusting to changing circumstances of the environment is nothing new as the aforementioned tradition of building dikes at the North Sea shows. In fact, changes requiring some form of adaptation are common. In a broader sense, adaptation takes place frequently on an individual basis: moving to a new city, starting a new job, or having a child are all examples of changing circumstances that require a change in behavior, which is a part of adaptation. Arguably, adapting to changing circumstances is part of our reality. Surely, adapting to rising sea levels is a much more complex task than moving into a new flat; however, it is not less necessary.

1.1.4 The Role of Law

Societies around the world need to address how to cope with a changing climate that also alters the environment. Some of the projected changes are far-reaching. Sea

¹⁷See below: Sect. 2.1.

¹⁸Klein et al. (2001), p. 533.

level rise, for instance, does not only put many coastal communities at risk but may submerge complete nations. Therefore, the need for an adaptation strategy could not be more evident. The European Union, for instance, recognizes the necessity to start adapting to climate change.¹⁹

Law as a core instrument of society not only governs all state action but also sets the framework for private individuals. Hence, law plays a key role in any adaptation to climate change. Binding regulations can enforce, enable or impede adaptation. Successful implementation of coastal adaptation, therefore, requires a facilitating environment set by the legal framework. For this reason, the purpose of this research is to analyze if and to what extent coastal adaptation is already enabled by current legal frameworks, taking Germany and New Zealand as examples.

1.2 Definitions

Before engaging in a detailed analysis of the two legal systems chosen as examples, the following section clarifies some of the key terms and concepts for coastal adaptation to climate change.

1.2.1 *Climate and Climate Change*

Climate in a narrow sense refers to the average weather (e.g. temperature, precipitation, and wind) over a longer period of time, e.g. 30 years. In a wider sense, climate is used to describe the state of the climate system, consisting of the atmosphere, hydrosphere, cryosphere, lithosphere, and biosphere. The climate system is influenced by internal dynamics and external impacts like volcanic eruptions or changing compositions in the atmosphere. The latter is also influenced by greenhouse gases.²⁰

In accordance with the United Nations Framework Convention on Climate Change (UNFCCC), the thesis uses the term **climate change** to refer to anthropogenic climate change. Article 1 of the aforementioned convention contains the following definition: “*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.*”

¹⁹Commission of the European Communities (2009), p. 3.

²⁰Intergovernmental Panel on Climate Change (IPCC) (2013), p. 1450 f.

1.2.2 *Climate Change Mitigation and Adaptation*

While **mitigation** refers to the reduction of greenhouse gases causing climate change,²¹ **adaptation** can be defined as “*the process of adjustment to actual or expected climate and its effects*”.²² In other words: mitigation reduces the impacts of climate change, adaptation reduces their severity.²³ Adaptation includes increasing robustness and resilience. While robustness is the ability to cope with a broader range of events, resilience refers to the ability to respond and recover from events.²⁴ Options and means to adapt can vary significantly. The ability of a state or a community to respond to the impacts of climate change is called **adaptive capacity**.²⁵

However, some adaptation actions may increase the vulnerability to the impacts of climate change in the future. This is referred to as **maladaptation**.²⁶ Post-disaster funding programs that help to rebuild communities without promoting adaptation or resilience are one example since the rebuilt community remains at the same risk as before the catastrophe.²⁷

Maladaptation can be reduced through **low-regret** strategies. This term refers to measures that provide benefits under current climate change and a range of future climate change scenarios. An example is the restoration of coastal wetlands that serves nature conservation and enhances coastal adaptation.²⁸

1.2.3 *Vulnerability and Resilience*

The terms of vulnerability and resilience relate to risks and hazards in general. **Vulnerability** is the “predisposition to be adversely affected” and reflects the sensitivity to harm as well as the (lack) of capacity to adapt.²⁹

While vulnerability relates to risk exposure, **resilience** refers to the ability to address the risk. Resilience can be defined as “*the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity,*

²¹Intergovernmental Panel on Climate Change (IPCC) (2013), p. 1458.

²²Intergovernmental Panel on Climate Change (IPCC) (2014), p. 1758.

²³Field et al. (2014), p. 94.

²⁴Farber (2011), p. 360.

²⁵Intergovernmental Panel on Climate Change (IPCC) (2014), p. 1758.

²⁶Intergovernmental Panel on Climate Change (IPCC) (2014), p. 1769.

²⁷Glavovic and Smith (2014), p. 4.

²⁸Lal et al. (2012), p. 342.

²⁹Field et al. (2014), p. 39.

and structure, while also maintaining the capacity for adaptation, learning, and transformation.”³⁰

1.2.4 Hazard, Risk and Hazard Risk

Hazards can be described as physical events, trends or impacts that can have negative consequences like the loss of life or property.³¹ Coastal erosion and coastal floods are hazards specific to coastal areas.³²

Risk, on the other hand, is the probability of occurrence of hazardous events resulting from the interaction of vulnerability, exposure, and hazard.³³ The severity of a storm surge, for instance, is an important but not the only parameter for coastal flood risk. Other determining factors include: proximity to the coast, land elevation, and the existence of protection works.

The combination of both terms—**hazard risk**—is used to define the source of a risk.³⁴ Thus coastal hazard risk refers to risk attributed to coastal hazards, i.e. coastal flood risk and coastal erosion risk.

1.2.5 Coastal Zone

Rising sea levels will affect coastal zones around the world. However, defining the **coastal zone** as the spatial scope of this thesis is not straightforward. Although the “coast” can be defined as “the land adjoining or near the sea”³⁵ this definition is too vague to identify the extent of the coastal zone. The definition, however, suggests that the coast is more than the area where land and sea directly intersect by using the term “near the sea”. Similarly, the definition of coastal ecosystems refers to the areas where land is influenced by the sea and vice versa, e.g. beaches or estuaries.³⁶ Since ecological processes extend beyond the narrow zone of direct land-sea influence, a definition of coastal zone based on coastal ecosystems includes parts of the coastal hinterland and the sea.³⁷ For the purpose of this thesis, the coastal zone includes all areas that are influenced by the tides or would be influenced by them if it were not for coastal defences. Using such a wide definition ensures that all areas that are

³⁰Field et al. (2014), p. 40.

³¹Intergovernmental Panel on Climate Change (IPCC) (2014), p. 1766.

³²See below: Sect. 2.2.

³³Intergovernmental Panel on Climate Change (IPCC) (2014), p. 1772.

³⁴Lawrence et al. (2018), p. 100.

³⁵Oxford Living Dictionaries English ‘Coast’.

³⁶Iglesias-Campos et al. (2015), p. 30.

³⁷Glavovic et al. (2014), p. 5.

potentially affected by coastal hazards are included in the analysis. Due to the dynamic interaction of land and the impact of rising sea levels, the boundaries of the coastal zone will change in the future, in most places moving further landward.³⁸

1.2.6 Coastal Hazards

The coastal hazards of coastal flooding and coastal erosion are expected to be exacerbated by rising sea levels and hence play an important role in coastal adaptation. **Coastal flooding** occurs when normally dry land is temporarily inundated by sea water.³⁹ While coastal flooding is a temporary, abrupt event, **coastal erosion** is more gradual. Coastal erosion can be defined as “*the encroachment upon the land by the sea*”, resulting in loss of land and undermining coastal defences like dunes or dikes.⁴⁰ Climate change is expected to change parameters that influence coastal erosion, such as the sea level, currents, winds, and waves.⁴¹

1.3 On the Comparative Aspect

1.3.1 Reasons for Choosing Germany and New Zealand As Examples

Coastal countries around the world are facing rising sea levels, and accordingly, coastal adaptation is an important issue for all of them. Germany and New Zealand were chosen as examples because they share enough similarities to make a parallel analysis feasible. At the same time, the existing differences between both countries promise valuable insights by contrasting the two legal systems.

1.3.1.1 Factual Similarities and Differences

Apart from the fact that both countries have a coastline and face challenges because sea levels are rising, Germany and New Zealand are both industrialized nations. Due to their financial resources, technical knowledge, and existing efficient institutions, they are in a better position to cope with climate change than poorer nations.⁴² In

³⁸Wong et al. (2014), p. 376.

³⁹Definition in *Federal Water Act: WHG*, § 72 cl. 1.

⁴⁰European Commission, p. 4.

⁴¹Wong et al. (2014), p. 376.

⁴²Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen (WBGU) (2006), p. 54.

other words, their adaptive capacity is higher. Unlike some countries like the Maldives, both states are not threatened to be completely submerged as a result of rising sea levels. Both countries have extensive higher, even mountainous areas, which are not influenced by the sea. Hence, the adaptation context and possibilities are also different from the mainly flat, low-lying Netherlands, where relocating to higher areas away from the coast, for example, is less likely to be an option.

The differences between both countries relate to the coastline. In New Zealand, the coast varies from steep cliffs to low-lying areas. While New Zealand's diverse coastline is sparsely protected, the low-lying German North Sea coast is characterized by a continuous dike line. The German Baltic Sea coast is in between the two extremes with its variable, not entirely protected coastline. Furthermore, the density of population within the countries varies greatly. In 2018, Germany had a population density of 232 people per km²,⁴³ while New Zealand had a significantly less population density of 18 people per km².⁴⁴ As a result, the factual and social setting of adaptation in both countries is different.

1.3.1.2 Institutional Differences

More important than topographic or demographic differences are the divergent political structures and responsibilities for coastal management and coastal adaptation for a legal analysis. Responsibilities in New Zealand are characterized by devolution to the local authorities with almost no involvement of the central government. On the contrary, in Germany, the states are the main actors but they receive substantial funding from the federal government. Moreover, New Zealand has a much stronger focus on land use planning in order to cope with coastal hazards than Germany, which can be described as a strongly protective state. In addition, because of its young history of settlement, New Zealand does not have a tradition of building defences as it exists at the German North Sea coast. This also creates different preconditions for adaptation. Another distinction that makes a comparison interesting relates to the protection of fundamental rights, in particular the protection of property rights, which play an important role in the context of the thesis. German law offers strong constitutional protection of fundamental rights, which is binding for all state powers, including the legislative. In New Zealand, on the other hand, fundamental rights are not protected by a supreme statute and Parliament is not bound by any constitution. Hence, the restrictions on state action are different, which also impacts adaptation action and adaptation regulation.

Due to the aforementioned differences, looking at how both countries and their legal systems currently enable and address coastal adaptation to rising sea levels

⁴³This results from an estimated population of 83 million people living on 357,582 km² of land. See: Statistische Ämter des Bundes und der Länder (2020).

⁴⁴This results from an estimated population of 4.9 million people living on 271.000 km². See: Statistics New Zealand Population.

promises valuable insights. Furthermore, some challenges like the uncertainty of magnitude and velocity of sea level rise, the flexibility of adaptation decisions and long-term planning for adaptation, are comparable, if not identical in both jurisdictions.

1.3.2 Comparative Aspects of This Thesis

Despite the focus on two different legal systems, this thesis does not aim to provide a classic comparative analysis. Neither does it take a narrow view on one legal institution in particular nor does it look at the general characteristics of the law of both countries as a macro-comparison would do. Differences in geology and settlement structure make a classic comparative study unfeasible since the physical geographical conditions are not alike enough. In a more general context, however, similarities like the need for adaptation become apparent. Responding to these circumstances, this work aims to analyze the overall concept of coastal adaptation in Germany and New Zealand. Henceforth, the analysis focuses on solutions to rising sea levels rather than conducting scrutinized research on a single adaptation action. The fact that rising sea levels will have many different impacts on the coasts around the world and adaptation to it does not have a uniform solution, supports taking a broader approach. Looking at coastal adaptation in response to rising sea levels is, therefore, the common point of reference. In the terminology of comparative law, this is the *tertium comparationis*.

1.3.2.1 The Functional Method and the Presumption of Similarity

Without going into detail on the methods of comparative law,⁴⁵ this work uses the functional method under the assumption that where problems are universal, the function can serve as *tertium comparationis*.⁴⁶ The thesis, therefore, looks at how adaptation strategies are reflected in the laws of Germany and New Zealand (or why not), bearing in mind that sometimes provisions can assume a function that was not originally intended. The latter reflects one of the main assumptions of the functional method: determining the function of a legal institution objectively, not by the purpose of its creators, i.e. understanding law in terms of the needs it meets. By focusing on how different elements respond to the same problem, the functional method enables a comparison of civil and common law despite their doctrinal difference.⁴⁷

⁴⁵See generally on comparative law and its methods: Samuel (2014).

⁴⁶Esser (1974), pp. 356–359.

⁴⁷Michaels (2008), pp. 350 and 356 f.