

Coastal flood and erosion risk under climate change: An overview of policies and legislation in Greece and Cyprus

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Abstract This short contribution provides a brief overview of the most relevant policies and legislation for the prevention and management of the coastal flood risk under climate change in Greece and Cyprus, following the ‘hierarchy of norms’: the most relevant International policy and legal instruments to which Greece and Cyprus, as Contracting Parties (CPs) are considered first, followed by the EU and National policies and legislation. Their review has shown that there are several challenges in the existing regulatory regimes, with the most important of which associated with the lack of consideration of the effect of coastline change (retreat/erosion) under climate change on the shoreline and beach legal demarcations.

Keywords: Coastal flood risk, Coastal erosion, Shoreline demarcation, Set back zones

1 Introduction

In recent decades, the marine coastal flood/erosion risk has increased impacting on the coastal natural and human environment, through coastline changes, biodiversity and human losses, and damages to coastal infrastructure/assets and many socio-economic activities/sectors (IPCC, 2023). Although this risk concerns only narrow strips of coastline, it has a huge economic loss potential (Munich Re, 2021); in Europe, the annual economic losses from coastal floods under climate change are projected for 2100 as up to about 0.5 % of the European GDP (EC-JRC, 2023). Thus, the design and implementation of effective coastal flood management plans is particularly urgent. As coastal zones are complex systems comprising recreational environments, transport infrastructure and urban/industrial clusters, quality risk assessments and management are required, underpinned by effective and synergetic policy and legal frameworks.

This short contribution provides a brief overview (due to space constraints) of the most relevant policies and legislation for the prevention and management of the coastal flood risk in Greece and Cyprus. It follows the ‘hierarchy of norms’: the most relevant International policy and legal instruments to which Greece and Cyprus are Contracting Parties (CPs) are considered first, followed by the EU and National policies and legislation.

2 International policies and legislation pertinent to the coastal flood risk

Current policy goals aim at strengthening resilience and promoting adaptation to existing and emerging climatic risks. In terms of relevant international strategies, policies and plans to which the EU Member States adhere, the 2030 Agenda for Sustainable Development (UN, 2015), the 2015 Sendai Framework for Disaster Risk Reduction-DRR (SFDRR, 2015) and the Regional Climate Change Framework for the Mediterranean Marine and Coastal Areas (UNEP, 2017) are the most important, as building resilience to and reduce disasters from climatic hazards are amongst their main objectives.

Management of the existing/future climatic risks (e.g., the coastal floods), is necessary for the achievement of many Sustainable Development Goals (SDGs) and Targets (SDTs) of the 2030 Agenda, including the SDT 1.5 ‘...build the resilience of the poor.... and reduce their exposure and vulnerability to climate-related extreme events...’; SDT 2.4 ‘...strengthen capacity for adaptation to climate change...’; SDT 9.1 ‘...develop quality, reliable, sustainable and resilient infrastructure...’; SDT 11.5 ‘...reduce deaths and the number of people affected and substantially decrease the direct economic losses ... caused by disasters...’; SDG 13 ‘strengthen resilience and adaptive capacity to climate-related hazards’; and SDG 14 ‘sustainably manage and protect marine and coastal ecosystems,...based on the best available scientific information’. As stated in the SFDRR preamble, there is a need to address existing and prepare for future disaster risks, by: monitoring, assessing and understanding the risk; information sharing, strengthening the participation of and co-ordination with relevant stakeholders; and research and development of relevant technologies and early warning systems (EWSs) the development/implementation of which have been proposed as an essential component of National Adaptation Plans – NAPs (UNFCCC, 2020).

Other international instruments of relevance include the international Agreements on climate change to which the EU Member States are contracting parties, notably the United Nation Framework Convention on Climate Change (UNFCCC, 1992) and the 2015 Paris Agreement

(UNFCCC, 2015), as well as Conventions dealing with the conservation of coastal ecosystems that can be impacted by coastal floods (e.g., the Ramsar Convention (Ramsar, 1971) and the Convention on Biological Diversity (CBD, 1992). In addition, particularly relevant is the Regional 1995 Barcelona Convention, and especially, its 2008 Integrated Coastal Zone Management (ICZM) Protocol (UNEP, 2008).

3 EU policies and legislation pertinent to the coastal flood risk

This review has found that the 2021 EU Climate Change Adaptation (CCA) Strategy (EC, 2021a), the EU Action Plan on SFDRR 2015–2030 (2016), and the Blue Growth policies (EC, 2021b) are of particular relevance in defining the European strategic priorities, plans and mechanisms for the coastal flood risk assessment and management. They promote infrastructure resilience, augmentation of adaptive capacity and reduction of vulnerability, and stress the importance of monitoring to assess progress, systematic data collection, National Risk Assessments (NRAs) and relevant research and innovation.

In terms of legislation, the EU Climate Law (EU, 2021a) is of particular relevance, envisaging strong action on CCA and resilience-building and assessment/review procedures (Art. 5). The Union Civil Protection Mechanism-UCPM (EU, 2021b), the main operational EU DRR tool, requires multi-hazard risk assessments, developing/refining risk management planning, co-ordination/integration of existing European and early warning systems (EWSs), and development of a relevant transnational service of EU interest (Art. 8). Another EU Regulation requiring sectoral responses is the Trans-European transport network - TEN-T Regulation (EU)1315/2013 that includes seaports and other transport infrastructure vulnerable to coastal flooding, which is currently under revision and expected to be much strengthened (EC, 2021c).

The most pertinent EU Directive is the 2007 Floods Directive - FD (EU, 2007) that imposes a general duty on Member States to assess the coastal flood risk, map the flood extent and humans and assets at risk and take adequate and coordinated measures to reduce/manage the risk. It requires Member States to draw up and submit to the European Commission (EC) comprehensive flood hazard and risk maps (FHRMs) and flood risk management plans (FRMPs) in recurring implementation cycles. Its first implementation cycle (completed in 2015) had a ‘patchy’ record in (among others) the Member States’ submissions of coastal FHRMs showing, in many cases, partial coastal coverage and gaps in the flood characteristics information (Velegrakis et al., 2021). For the second implementation cycle (2016-2021), the FHRM submissions are currently under review whereas, according to the latest information (https://environment.ec.europa.eu/topics/water/floods_en) Greece and Cyprus are the only EU Member States that had not even begun (end of March 2023) the public consultation process required for the FRMPs’ adoption.

Other relevant EU legislation includes the amended Environmental Impact Assessment (EIA) Directive (EU, 2014) that requires coastal flood assessments to facilitate coastal infrastructure resilience and environmental protection; quality information on climatic hazards/risks,

including flood risk mapping, is critical in this context. Another Directive the implementation of which (implicitly) requires flood risk monitoring/assessment is the Water Framework Directive (EU, 2000) that aims (amongst others) at the protection and improvement of the coastal water quality which can be adversely impacted by coastal floods. There is also environmental EU legislation aiming at the protection of (coastal) ecosystems, which although not dealing explicitly with the coastal flood risk, still necessitates its assessment and management. For example, the Habitats Directive (EU, 1992) requires implementation of measures for the conservation of coastal habitat types, vulnerable species habitats and site designation for an EU-wide network (Natura 2000) for which there are particular conservation requirements. Thus, there is an implicit obligation to develop integrated risk cycle monitoring services that can improve flood preparedness, response, recovery and prevention for these protected ecosystems. Finally, there are also EU Directives dealing with the right of access to and the coherence of essential information for effective coastal flood risk assessment and management: Directive 2003/4/EC (EU, 2003) and the INSPIRE Directive (EU, 2007b) that aims to establish compatible and usable spatial data infrastructures (SDIs) in a EU-wide and transboundary context.

4 National Legislation

Here, a brief overview of national frameworks of Greece and Cyprus pertinent to coastal flood resilience is presented. Both countries adhere to the international and EU policies/legislation referred to in the previous Sections. In addition, there is also ‘autonomous’ national and sub-national legislation the sheer volume of which does not allow for a comprehensive analysis in this short contribution. Therefore, the following sections present very brief summaries, focusing on a most significant issue for the coastal flood risk assessment and management. This is associated with the shoreline demarcation under changing sea levels that may have significant/contentious implications for coastal rights and responsibilities.

4.1 Greece

Coastal zone management is a complex system, involving 3 Governance levels-tiers (Central, Regional and Local) and decentralized administrations responsible for some state auditing/executive tasks. Key administrative bodies include the Regional Directorates of Public Property, Ministry of Finance (L.142/2017) and the (elected) Regional and Municipal (local) Councils.

As an EU Member State, Greece adheres to the EU policies/plans and must comply with the EU legislation for coastal floods. The legal framework for the assessment and management of coastal floods can be found in L.4414/2016 (Gov. Gaz. 149/A/9.8.2016) that stipulates design/implementation of a National Adaptation Strategy (NAS) in line with international and EU policies and legislation and Regional Adaptation Action Plans; some of those are still under preparation. Relevant legislation includes the ‘2001 Coastal Law’ L.2971/2001 (as amended by laws L.4607/2019, L.4797/2021, L.4850/2021), the ‘Preservation of Biodiversity and Other Provisions’ Law

(L.3937/2011) and planning legislation such as the ‘Spatial and Urban Planning’ Law (L.4447/2016). Coastal management issues including the establishment of protected areas, conservation, biodiversity and the coastal flood/erosion risk are dealt with in specialized legislation.

There are significant implications stemming from the observed and projected changes of shoreline position under the rising mean and extreme sea levels. The existing legal definitions/procedures do not provide certainty or consider the increasing shoreline dynamics. Under the 2001 Coastal Law, the ‘shoreline’ (*aigialos*) that forms the public/private domain boundary is defined, rather vaguely, as the line that might be reached by the usual highest wave excursion, excluding unusual storm events. This usual maximum wave excursion (*aigialos* line) should be demarcated by a competent authority, with the procedure involving the establishment of technical committees that proceed on a case-by-case basis (Art. 4). On the basis of the *aigialos* delineation, the ‘beach’ (*paralia*) is defined as its adjacent land zone; its width is decided also on a case-by-case basis considering the local conditions. *Paralia* has a minimum set width of 30 m that could be extended to 50 m, or limited to < 30 m (L. 2971/2001, Art.7). Permanent construction is not allowed (Art. 13), but the ‘paralia’ can be utilized for public use and commercial, industrial and transportation purposes in the public interest (Art. 14).

Due to major delays in the demarcation process caused by imprecise criteria and resource-intensive procedures, a ‘fast-track’ procedure was adopted in 2014 (and further amended in 2019) involving interpretation of orthophoto maps and approval by regional committees and decentralized administrations.

As no construction is allowed on the ‘paralia’, this is a *de facto* set-back zone that can be, however, narrowed under the exceptions provided in local planning regulations, the 2013 Tourism Law (L.4179/2013, Art. 5), and specialised planning regimes established to promote private investment and facilitate public property privatization (e.g., L.3894/2010, L.4146/2013 and the currently proposed regulation). There are also challenges from the legislation proliferation and conflicting priorities of the involved institutions, as well as from the weak monitoring/control of coastal development practices over several decades (Balla and Giannacourou, 2021).

Apart from the conferring fundamental public use rights a significant objective of the *aigialos* and *paralia* set back regulation has been to mitigate losses/damages for the backshore infrastructure/assets which can be huge and increasing (EC-JRC, 2023); it is noted that the Greek Constitution stipulates that the environmental protection is a State duty (Art. 24). In any case, the ‘Achilles heel’ of the current coastal regulation to achieve this policy objective is that it does mostly not account for the mean and extreme sea level rise impacts. The Greek official depository of demarcated shorelines contains coastal areas with decades’ old demarcations (<https://www.minfin.gr/-/e-eureterio-aigialon>) which do not either reflect the existing or the projected shoreline retreat under sea level rise (Monioudi et al., 2017). Although coastal resilience under climate change is an objective of the 2016 NAS (https://www.preventionweb.net/files/61765_06.04.2016.pdf) and are also other legal instruments (e.g., the EIA and

Flood Directives) prescribing assessment/management of flood impacts, explicit requirements for shoreline and set back zone demarcations under climate change are found only in the 2008 ICZM Protocol to the Barcelona Conventions (Art. 8). However, Greece has not ratified the Protocol (in-force since 2011).

4.2 Cyprus

There are two tiers of government in the Republic of Cyprus: central and local. Various aspects of the coastal management are under Prefecture competence, whereas the coastal floods and protection, spatial planning, asset expropriation, concessions and public land leases are under the authority of and licensing by the respective Ministries.

Cyprus is a Contracting Party to the Ramsar Convention, the 1992 CBD (L.8(III)2001) and the 1995 Barcelona Convention (but has not ratified its 2008 ICZM Protocol). As an EU Member State, Cyprus adheres to the evolving European Policies/Plans and is required to comply with European legislation relevant to coastal floods through its transposing into the national framework. For example, the EIA Directive transposing Law (L.127(I)2018) identifies the projects requiring environmental impact assessments; for projects planned in a protected Natura 2000 area, EIAs are also required by the Habitats Directive transposing law. With regard to the FD first implementation cycle (2010-2015), Cyprus did not include information on coastal floods; in the second cycle, Cyprus is expected to have provided such FHRMs.

The spatial planning Law ‘on Urban and Spatial Planning’ (1970/1990) provides for the respective planning frameworks. There are an Island Plan and Local Plans, Area Schemes, and policy declarations. Local plans cover the local built environment development, whereas the Island Plan provides for the establishment of protected areas. Cyprus has moved towards the implementation of a coastal zone management plan, following the compilation of the ICZM National Strategy and Action Plan for the period 2018 - 2028.

The term ‘coastal zone’ appears in the ‘On Hydrography and Nautical Mapping’ Law (L.96(I)2014) and is defined as ‘*a geomorphological zone on both sides of the shoreline in which terrestrial and marine components interact... and interacts and co exists with the human environment and activities*’. The major legal instrument for shore protection and management is the ‘Foreshore Protection Law’ 1959 (as amended). It defines the ‘beach’ as the area within a distance of no more than 100 yards (91.44 m) from the highest tide line. Protected Beach Zones are created and a general building ban is set, with exemptions for reasons of public interest or through special Ministerial licensing; these zones have been mostly defined by decrees during the 1960s’ and 1970s’. The delineation of the beach (which is not always a public space as private plots of land may be included, Art. 3.2) is made by an administrative ‘Notification’ by the Minister of Interior communicated through the National Gazette. Similar ‘Notifications’ can be issued by the Prefectures who may impose bans on interventions to the Beach Zone. The Prefectures are also responsible for the demolition of illegal constructions.

Central Beach Committees and Local Beach Committees are the competent authorities for the beach management, Legislation on concession/licensing is found at the ‘Regulations for the Concession of Public Land’ issued by the Ministerial Council. Interestingly, its Art. 8 defines a ‘quasi set-back zone’, by introducing a general ban on the lease or licensing of use of public property that is located in distances < 500 m from the highest tide line, although exemptions are also provided.

There have been various problems due to the fact that the Beach Protection Zones have demarcated several decades ago and there has been no consideration for shoreline changes; consequently, parts of the protection zones are now located within the adjacent maritime areas. Also, although a distance of 100 yards from the highest tide line is set by law, beach zones may appear with various widths and certain land plots may have been ‘excluded’ or ‘bypassed’. The situation is likely to deteriorate under the projected sea level rise (Monioudi et al., 2023) This highlights the need of legally set, detailed criteria to demarcate the ‘beaches’ under climate change such as those of the 2008 ICZM Protocol.

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