NOVAFCSH
FACULDADE DE CIÊNCIAS SOCIAIS E HUMANAS
UNIVERSIDADE NOVA DE LISBOA

From coastal defence to coastal adaptation. The role of coastal boundary lines in coastal management plans: a comparative study between Portugal and South Africa

Bruno Miguel Almeida Neves

Tese de Doutoramento em Geografia e Planeamento Territorial
área de especialização em Detecção Remota e
Sistemas de Informação Geográfica

ANEXOS

Agosto, 2019

LIST OF ANNEXES

Annex 1. Setback lines implementation examples wordwide. Methods and purposes.

COUNTRY/ REGION	METHOD	REFERENCE FEATURE	SETBACK LINE DISTANCE	FEATURES WORTHY OF PROTECTION/ OBJECTIVE	TERRITORIAL MANAGEMENT INSTRUMENTS	SOURCE
Alabama, US	Floating	Mean high tide	Coastal Construction Line (arbitrary line on a map)	-	-	(Simpson et al., 2012)
American Samoa	Fixed	Mean high tide	200ft (60,96m)	-	-	(Simpson et al., 2012)
Anguilla, Caribbean Islands	-	Line of vegetation	50-300ft (15-91m)	-	-	(Simpson et al., 2012)
Antigua & Barbuda, Caribbean Islands	-	Line of vegetation	18-91m	-	-	(Simpson et al., 2012)
Australia, New South Wales	Fixed	High water mark	1km	-	-	(Simpson et al., 2012)
Australia, South Australia	Fixed	High water mark	100m	-	-	(Simpson et al., 2012)
Australia, Victoria	Fixed	High water mark	200m	-	-	(Simpson et al., 2012)
Bahamas	-	Line of vegetation; ridge; dune crest	5-15m	-	-	(Simpson et al., 2012)
Barbados, Caribbean Islands	Fixed	Mean High Water Mark (MHWM)	30m from the MHWM (sandy beaches) 10m from the cliff edges	Development, ecosystems, important historical or archaeological sites (i.e. mangroves or turtle nesting sites)	Town and Country Planning Act; Coastal Zone Management Act; Integrated Coastal Management Plan	(Linham & Nicholls, 2010)
	Fixed	High water mark	30m 10m cliff top	Unique features can expand this limit, existing buildings can reduce it	- -	(Simpson et al., 2012)
Belize	Fixed	-	66ft (20m)	-	National Lands Act, Volume IV Chapter 191 Sec. 12 (8)	(Simpson et al., 2012)

Brazil	-	Tidal Line	50-200m	-	-	(Simpson et al., 2012)
Canada, British Columbia	-	Flood construction level in 2100	15m	-	-	(Simpson et al., 2012)
Canada, Halifax	Fixed	High water mark	2.5m elevation	-	-	(Simpson et al., 2012)
Canada, New Brunswick	Fixed	Higher high water large tide	30m	-	-	(Simpson et al., 2012)
Chile	Fixed	-	80m	-	-	(Simpson et al., 2012)
Colombia	Fixed	-	50m	-	-	(Simpson et al., 2012)
Costa Rica	-	Ordinary high tide	50m + 150m	-	Law of the Maritime and Terrestrial Zone	(Simpson et al., 2012)
Cuba	-	Line of vegetation; ridge; dune crest	40-80m	-	-	(Simpson et al., 2012)
Delaware, US	Fixed	7ft (2.1m) elevation - above the national geodetic vertical datum (NGVD) - from the seaward, landwards	100ft (30.5m)	-	-	(Fenster, 2005)
	Fixed	10ft elevation height Mean high water (Whichever is most seaward)	100ft	-	-	(Simpson et al., 2012)
	Fixed		1 000ft	-	-	
Denmark	Fixed	Shoreline	3km	Restricts development	-	(Sas et al., 2010)
			300m	Secure public access	-	
Dominican Republic	Fixed	High water mark	60m	-	-	(Simpson et al., 2012)
Ecuador	Combined fixed and floating	-	8m + mangrove greenbelt	-	-	(Simpson et al., 2012)
Egypt	Fixed	-	200m	Prohibits new development and constructions	-	(Sanò et al., 2010)
Finland	Fixed	Shoreline	100m	Restricts development	-	(Sas et al., 2010)
Florida, US	-	Seasonal High Water Line (SHWL)	-	-	-	(Fenster, 2005)
	Floated	Seasonal High Water Line (SHWL)	30x erosion rate Coastal Construction Line	-	-	(Simpson et al., 2012)

Georgia, US	-	Low water mark	Line of vegetation	-	-	(Simpson et al., 2012)
Germany	-	-	100-200m	-	Schleswig-Holstein National Park Act, Mecklenburg-Vorpommern Nature Protection Law	(Simpson et al., 2012)
Guam, US	Fixed	Mean high water mark	35ft Structures ≤ 20ft high 75ft Structures > 20ft high	-	-	(Simpson et al., 2012)
Hawaii, Kauai, US	Fixed	Certified shoreline	Lot average depth ≤100ft Setback is 40ft. Increasing 10ft for every 20ft in lot's average depth until <160ft	Reduce the impacts of coastal hazards to property, life, and coastal resources	Kauai County's Shoreline Setback; Coastal Protection Ordinance	(NOAA, 2012)
	Combined fixed and floating		For lots average depth >160ft then building's footprint ≤5000sq.ft = setback 40ft + 70x AER			
			Building's footprint ≥5000sq.ft = setback 40ft + 100x AER			
Hawaii, US	Fixed	Upper wash of waves at high tide	20-40ft	Shoreline Area	-	(Simpson et al., 2012)
	Combined fixed and floating		40ft plus 70x annual coastal erosion	Conservation Area lots with greater than 200ft of depth	-	
			40-90ft Depending on Lot Depth	Conservation Area lots with less than 100ft of depth at 40ft, plus 10ft for every 20ft of depth	-	
Israel	Fixed	0.75m above current sea level	100m	Prohibits development	Coastal Environmental Protection Law of 2004	(Sas et al., 2010)
Kerala, India	Fixed	High Tide Line (HTL)	100, 200 and 500m	Protect coastal environment and local communities from coastal hazards	Coastal Zone Management Plan for the State of Kerala; Coastal Zone Regulation Notification (CRZ)	(National Centre for Earth Science Studies, 2018)
Maine, US	Fixed	High tide mark	25ft	General Development Districts	-	(Simpson et al., 2012)
			75ft	Shore land Zone	-	

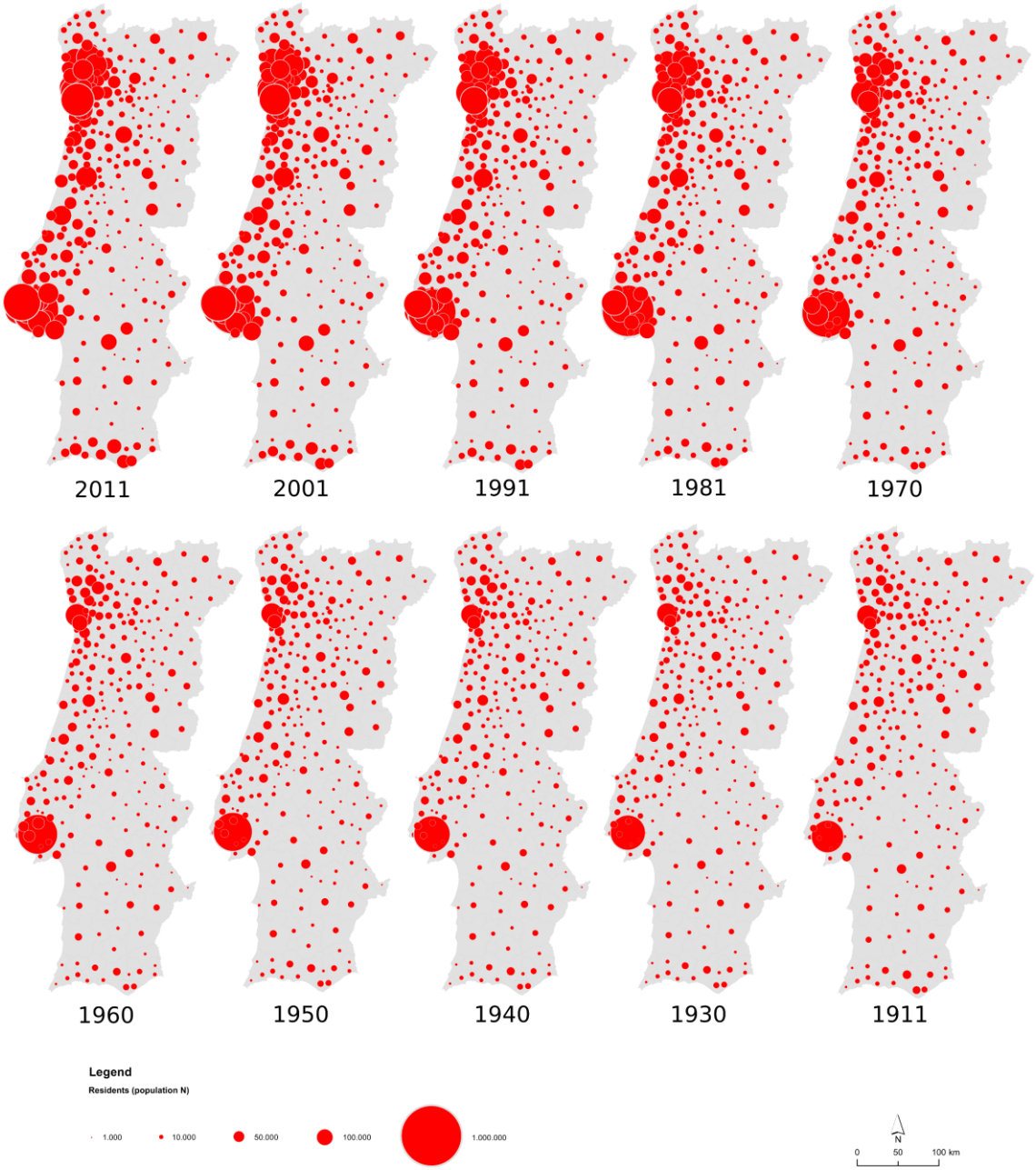
Medit. Countries	Fixed	Highest Winter Waterline	Not less than 100m	Areas directly and negatively affected by climate change and natural risks	PROTOCOL on Integrated Coastal Zone Management in the Mediterranean	(European Commission, 2009a)
Mexico	-	-	20m	-	-	(Simpson et al., 2012)
Michigan, US	Combined fixed and floating	15ft, plus 30x erosion rate	Erosion Hazard Line	Small structures	-	(Simpson et al., 2012)
		15ft, plus 60x erosion rate		Larger structures	-	
Minnesota, US	Combined fixed and floating	-	50x annual erosion rate + 25ft (7,6m)	-	Minnesota's North Shore Management Plan	(NOAA, 2012)
		-	50x annual erosion rate + 125ft (38.1m) for areas with no erosion data	-		
	Fixed	Line of vegetation	40ft	-	-	(Simpson et al., 2012)
		Average water level	75ft	-	-	
Nevis	-	Line of vegetation	60-500ft (18-152m)	-	-	(Simpson et al., 2012)
New Hampshire, US	Fixed	Highest Astronomical Tide	50ft	-	-	(Simpson et al., 2012)
New Jersey, US	Combined fixed and floating	-	-	To safeguard areas prone to severe erosion	-	(Fenster, 2005)
	Fixed	Mean High Water	Seaward foot of dunes	Beaches	-	Simpson et al., 2016
	Combined fixed and floating	25ft seaward of bluff toe/HWL	25ft landward of crest/50x erosion	Coastal bluffs	-	
		Bluff crest	30x erosion rate/ 60x erosion rate	Erosion hazard areas – coastal bluffs	-	
		Most seaward dune crest	30x erosion rate/ 60x erosion rate	Erosion hazard areas – unvegetated dunes	-	
		First vegetation line	30x erosion rate/ 60x erosion rate	Erosion hazard areas – vegetated dunes	-	
		Landward beach edge/ 8' contour	30x erosion rate/ 60x erosion rate	Erosion hazard areas – non-dune areas	-	
		Seaward toe of dune/ landward beach edge	Inland limit of sediment transport	Overwash areas	-	
	Fixed	Navigable water body	100ft	In flood hazard areas	-	

New York, US	Fixed	Mean low water	Seaward/lake ward toe of dune/bluff	Beaches with bluffs or dunes	-	(Simpson et al., 2012)
	Fixed	Line of permanent vegetation	100ft	Beaches without bluffs or dunes	-	(Simpson et al., 2012)
	Fixed	Bluff's receding edge/ point of inflection	25ft	Bluffs	-	(Simpson et al., 2012)
	Fixed	Landward beach boundary	25ft	Primary Dunes	-	(Simpson et al., 2012)
	Floating	Landward limit of fronting natural protective feature	40x erosion rate	Structural Hazard Areas	-	(Simpson et al., 2012)
New Zealand	Fixed	-	66ft (20m)	Protect the natural character; open space; public access; and amenity values of the coastal environment; indigenous biological diversity; historic heritage	New Zealand Resource Management Act of 1991	(New Zealand Government, 2010; Simpson et al., 2012; Williams et al., 2018)
Nicaragua	Fixed	High tide line	50m	-	-	(Simpson et al., 2012)
North Carolina, US	Floating	-	AAER x30 with a minimum 60ft (18.3m) setback	Single-family dwellings 5,000sq.ft (464.5sq.m)	-	(Fenster, 2005)
	Combined fixed and floating	-	-	To safeguard areas prone to severe erosion	-	(Fenster, 2005)
	Floating	First line of stable and natural vegetation	Structures <5000sq.ft (1524sq.m) 30x long-term AAER	All structures	North Carolina's Administrative Code for Ocean Hazard Areas (15A NCAC 7H .0306)	(NOAA, 2012)
			Structures between 5000sq.ft and 9999sq.ft (3047.7sq.m) 60x long-term AAER			
			≥10000sq.ft (3048sq.m) have incremental setback lines sizes, reaching a maximum of 90x for structures with ≥100000sq.ft (30480sq.m)			
	Floating	Line of stable natural vegetation Landward of crest of primary/frontal dune, or	30x erosion rate/60ft for structures <5,000 sq.ft	-	-	(Simpson et al., 2012)
			60x erosion rate/120 ft for structures 5,000-9,999 sq.ft	-	-	

		Ocean Hazard Setback, whichever is most landward	90x erosion rate/180 ft for structures ≥ 10,000 sq.ft	-	-	
Norway	-	Shoreline	100m	-	National Policy Guideline	(Simpson et al., 2012)
Oregon, US	Fixed	Low water line	Line of vegetation	Ocean Shores	-	(Simpson et al., 2012)
	Fixed	Low water line	Point of definite change in material type or landform or vegetation line	Beaches	-	
Panama	Fixed	-	20m	-	-	(Simpson et al., 2012)
Pennsylvania, US	Combined fixed and floating	Bluff edge or crest	Structure lifespan x erosion rate, minimum of 25ft	Residential: 50 years	-	(Simpson et al., 2012)
			Structure lifespan x erosion rate, minimum of 25ft	Commercial: 75 years	-	
			Structure lifespan x erosion rate, minimum of 25ft	Industrial: 100 years	-	
Poland	Fixed	Dune ridge and the upper edge of a cliff	200m landward of the dune ridge	Technical Belt (10m to 1km)	Maritime Administration	(Fenster, 2005)
			100m inland of the upper edge of a cliff			
	-	-	200m	-	Act on Marine Areas of the Polish Republic; Maritime Administration 1991	(Simpson et al., 2012)
Puerto Rico	-	High tide line	approximately 150ft (50m) or 2.5 x building height (Whichever is greater)	-	-	(Simpson et al., 2012)
Russia	Fixed	-	1km (3280.8ft)	Economic and military strategic importance	-	(Fenster, 2005)
Spain	Fixed	Landward Limit of the Shore	100m	-	National Shores Act	(Simpson et al., 2012)
Sweden	Fixed	Shoreline	100m	-	Environmental Code	(Simpson et al., 2012)
Turkey	Fixed	Shore Edge Line	50m	-	Shore Law	(Simpson et al., 2012)
Uruguay	Fixed	High water mark	250m	-	-	(Simpson et al., 2012)

Venezuela	Fixed	-	50m	-	-	(Simpson et al., 2012)
Virgin Islands, US		Line of low tide	50ft; First line of vegetation; Natural barrier (Whichever is most seaward)	-	-	(Simpson et al., 2012)
Rhode Island, US	Fixed or floating	Inland boundary of most landward coastal features	30x erosion rate (Whichever is greater)	Residential	-	(Simpson et al., 2012)
			60x erosion rate (Whichever is greater)	Commercial	-	
			50ft (Whichever is greater)	-	-	
			25ft from Coastal Buffer Zone (Whichever is greater)	-	-	
Rodney District Council, New Zealand	Fixed	-	50m	Rural areas	New Zealand Resource Management Act of 1991	(Williams et al., 2018)
		-	23m	Urban areas		
South Carolina, US	Fixed	Ocean	Escarpment / Line of vegetation Whichever is greater	-	-	(Simpson et al., 2012)
Texas, US	Fixed	Mean Low Tide	Line of Vegetation	Public Beach	-	(Simpson et al., 2012)
		Mean High Tide	Up to 1000ft	Critical Dune Areas	-	
Virginia, US	Fixed	Low water line	Line of woody vegetation	Beaches	-	(Simpson et al., 2012)
	Fixed	Mean high water	Landward dune grade <10%	Coastal Primary Sand Dunes	-	(Simpson et al., 2012)
	Floating	Dune crest	20x erosion rate	Barrier Islands	-	(Simpson et al., 2012)
Wisconsin, US	Fixed	Ordinary High Water Line (OHWL) and the cliff edge	75ft (22.9m) in both cases	Protection from erosion	-	(Fenster, 2005)

Annex 2. Population number (residents) according to the census data (Statistics Portugal), by municipality.



Annex 3. Script of the semi-structured interviews for Portugal and South Africa.

Script of the Interview for the Portuguese case study

1. Introdução/Apresentação

    1.1. Que papel desempenha atualmente na sua instituição?

    1.2. Por favor, explique o seu papel (atual e passado) em relação à política de implementação de Faixas de Salvaguarda, referidas no Decreto-Lei n.º 159/2012, a implementar nos Programas de Orla Costeira (POC)?

QUESTÕES REFERENTES A FAIXAS DE SALVAGUARDA

A. Relacionadas com o Planeamento

A.1. Quais foram as práticas anteriores (antes do Decreto-Lei n.º 159/2012) para a delimitação de Faixas de Salvaguarda (Faixas de Risco) em Portugal? Como é que as Faixas de Salvaguarda eram desenvolvidas e geridas? Eram eficazes e/ou bem-sucedidas?

A.2. Qual é o fundamento para a inclusão de Faixas de Salvaguarda, referidas no Decreto-Lei n.º 159/2012, a implementar pelos Programas de Orla Costeira (POC)?

A.3. Quais são as principais diferenças entre os anteriores Planos de Ordenamento da Orla Costeira (POOC) e os atuais Programas de Orla Costeira (POC) e que implicações é que estas alterações trouxeram relativamente às anteriores Faixas de Risco, atuais Faixas de Salvaguarda?

A. 4. As Faixas de Salvaguarda são responsabilidade dos POC (Decreto-Lei n.º 159/2012), no entanto alguns municípios/cidades costeiras já começaram a delinear as suas próprias linhas de gestão costeiras ("faixas de risco").

    A.4.1. Quais são as razões para que estes priorizem a sua implementação?

    A.4.2. Que implicações legislativas e práticas podem decorrer destas ações?

    A.4.3. Como é que as Faixas de Salvaguarda estão alinhadas entre municípios/cidades e os POC, e entre os vários POC?

A.5. Quais são as principais razões para delinear Faixas de Salvaguarda em Portugal? Que outras razões existem para delinear Faixas de Salvaguarda?

A.6. Quais são os principais desafios à implementação de linhas de gestão costeira como são as Faixas de Salvaguarda?

A.7. Qual é a relação entre os riscos climáticos costeiros (tempestades, inundações, erosão, etc.) e as Faixas de Salvaguarda?

A.7.1. Como é que os riscos costeiros são incorporados nas Faixas de Salvaguarda na sua área geográfica?

A.7.2. Quais são as fontes de informação associadas aos riscos climáticos costeiros para a sua área e como é que estas foram incorporadas nas Faixas de Salvaguarda?

A.8. Que instituições (a nível nacional, regional e municipal) dão suporte ao desenvolvimento e implementação das Faixas de Salvaguarda?

A.9. Com que frequência são as Faixas de Salvaguarda revistas tendo em atenção as mudanças climáticas e costeiras?

A.9.1. Quais são os problemas/desafios relacionados a Faixas de Salvaguarda ditas "absolutas"/"estáticas"?

A.9.2. Com que frequência devem estas ser revistas?

A.9.3. Como é que se processa a revisão das Faixas de Salvaguarda?

A.9.4. Quais são as implicações associadas às Faixas de Salvaguarda que já não fornecem uma prevenção ajustada aos riscos costeiros e climáticos?

A.9.5. Está prevista alguma situação que possa levar a antecipar uma alteração?

A.10. Quais são os desafios à implementação de Faixas de Salvaguarda em áreas costeiras infraestruturadas/desenvolvidas?

A.11. Quais são os desafios ao desenvolvimento/infraestruturar em novas áreas costeiras e à implementação de Faixas de Salvaguarda?

A.12. Como é que as Faixas de Salvaguarda são incorporadas nos Planos Diretores Municipais e noutros processos de controlo de construção?

A.13. Qual é o papel da sociedade civil e das partes interessadas relativamente à identificação e implementação de Faixas de Salvaguarda?

A.14. Existem políticas alternativas ao uso de Faixas de Salvaguarda com o objetivo de reduzir o risco em infraestruturas costeiras?

B. Questões relacionadas com SIG

B.1. Têm as autoridades competentes (APA) técnicos/funcionários capacitados para delinear e implementar Faixas de Salvaguarda?

B.2. Qual a importância dos Sistemas de Informação Geográfica/Tecnologias de Informação Geográfica (SIG/TIG) como ferramentas para o desenvolvimento de Faixas de Salvaguarda?

B.3. Descreva o papel dos SIG/TIG em todo o processo de desenvolvimento de Faixas de Salvaguarda?

B.4. A qualidade e a disponibilidade de dados são um problema no desenvolvimento de Faixas de Salvaguarda? Nas situações em que se aplica, como é que é gerido o conflito entre precisão e "tolerância"/erro?

B.5. Existem potenciais representações espaciais alternativas às linhas “absolutas”/”estáticas” para delinear risco?

1. Introduction

1.1. What is your current role in your institution?

1.2. Please explain your role (current and past) in relation to the *Setback Lines* (Faixas de Salvaguarda) policy, referred to in *Decreto-Lei no. 159/2012*, to be implemented in the Coastal Management Programmes (POC)?

QUESTIONS ON COASTAL MANAGEMENT LINES (CML)

A. Management related

A.1. What were the past practices (prior to *Decreto-Lei no. 159/2012*) for *Setback Lines* delineation in Portugal? How were *Setback Lines* developed and governed? Were they effective and/or successful?

A.2. What is the rationale for including *Setback Lines* the in *Decreto-Lei no. 159/2012*, to be implemented in the Coastline Programmes (POC)?

A. 3. What are the main differences between the previous Coastal Management Plans (POOC) and the actual Coastal Management Programmes (POC), and what are the implications in terms of changes concerning the previous and the actual *Setback Lines* (Faixas de Risco/Faixas de Salvaguarda)?

A.4. *Setback Lines* are a Coastal Management Programmes responsibility (*Decreto-Lei no. 159/2012*), yet some coastal municipalities/cities already started delineating their own *Setback Lines*.

A.4.1. What are the reasons for these to prioritize *Setback Lines* implementation?

A.4.2. What are the policy and practical issues relating to this action of municipalities/cities?

A.4.3. How are *Setback Lines* aligned between municipalities/cities and the Coastal Management Programmes (POC), and adjacent POC jurisdiction areas?

A.5. What are the primary reasons to delineate *Setback Lines* in Portugal? What are other reasons to delineate *Setback Lines*?

A.6. What are the main challenges for the implementation of coastal boundary lines such as *Setback Lines*?

A.7. What is the relationship between coastal climate hazards (storm surges, flooding, erosion, etc.) and *Setback Lines*?

A.7.1. How are the coastal hazards in your area incorporated in *Setback Lines*?

A.7.2. What are the sources of information on coastal climate hazards for your area and how was that incorporated into *Setback Lines*?

A.8. What institutions (national, regional and municipal) support the development and implementation of *Setback Lines*?

A.9. How often are *Setback Lines* reviewed in light of coastal and climate change?

A.9.1. What are the issues/challenges relating to "static" *Setback Lines*?

A.9.2. How often do you think these should be reviewed?

A.9.3. What is the process for the review of *Setback Lines*?

A.9.4. What are the implication of *Setback Lines* that are no longer providing accurate avoidance of coastal and climate hazard?

A.9.5. Is there any situation that may lead to an earlier modification?

A.10. What are the challenges of existing/legacy coastal development/infrastructure and the implementation of *Setback Lines*?

A.11. What are the challenges of new coastal development/infrastructure and the implementation of *Setback Lines*?

A.12. How are *Setback Lines* incorporated into Municipal Master Plans and building control processes?

A.13. What is the role of civil society and stakeholders in relation to *Setback Lines* identification and implementation?

A.14. What are potential policy alternatives for the use of *Setback Lines* in order to reduce risk to coastal infrastructure?

B. GIS related

B.1. Do the competent entities (APA) have the adequate technicians/staff to delineate and implement *Setback Lines*?

B.2. How important is Geographic Information Systems/Geographic Information Technologies (GIS/GIT) as tools for the development of *Setback Lines*?

B.3. Describe the role of GIS/GIT in the entire *Setback Lines* development process?

B.4. Is data quality and data availability a problem in developing *Setback Lines*? In situations where it applies, how is the conflict between accuracy and "tolerance"/error managed?

B.5. What are potential alternatives spatial representations i.e. "absolute"/"static" lines to delineate risk?

Script of the Interview for the South African case study

1. Introduction/presentation

    1.1. What is your current role in your institution?

    1.2. Please explain your role (current and past) in relation to the Coastal Management Lines (CML) policy in the Integrated Coastal Management Act (ICM Act)?

QUESTIONS ON COASTAL MANAGEMENT LINES (CML)

A. Management related questions

A.1. What were the past practices (prior to the ICM Act) for setback delineation in South Africa? How were Coastal Management Lines developed and governed? Were they effective and/or successful?

A.2. What is the rationale for including Coastal Management Lines in the ICM Act?

A. 3. Coastal Management Lines are a Provincial responsibility (ICM Act) and yet some coastal municipalities (especially coastal cities) started delineating their own Coastal Management Lines.

    A.3.1. What are the reasons for cities prioritizing CML implementation?

    A.3.2. What are the policy and practical issues relating to this action of cities?

    A.3.3. How are CML aligned between cities and provinces, and adjacent provinces?

A.4. What are the primary reasons to delineate CMLs in South Africa? What are other reasons to delineate CMLs?

A.5. Coastal Management Lines (in Western Cape, Overberg District Municipality) have registered conflict situations between ICM Act and Environmental Impact Assessment.

    A.5.1. What is the role of EIAs in the implementation of CMLs?

    A.5.2. Can you explain the nature of the conflict?

    A.5.3. Which of the two policies prevail if there is conflict?

    A.5.4. How is this conflict managed?

A.6. What are the main challenges for the implementation of coastal boundary lines such as Coastal Management Lines?

A.7. What is the relationship between coastal climate hazards (storm surges, flooding, erosion etc) and CMLs?

A.7.1. How are the coastal hazards in your area incorporated in CMLs?

A.7.2. What are the sources of information on coastal climate hazards for your area and how was that incorporated into provincial CMLs?

A.8. What institutions (national, provincial and municipal) support the development and implementation of CMLs?

A.9. How often are CMLs reviewed in light of coastal and climate change?

A.9.1. What are the issues/challenges relating to static CMLs?

A.9.2. How often do you think these should be reviewed?

A.9.3. What is the process for the review of CMLs?

A.9.4. What are the implication of CMLs that are no longer providing accurate avoidance of coastal and climate hazard?

A.9.5. Is there any situation that may lead to an earlier modification?

A.10. What are the challenges of existing/legacy coastal development/infrastructure and the implementation of CMLs?

A.11. What are the challenges of new coastal development/infrastructure and the implementation of CMLs?

A.12. How are CMLs incorporated into municipal land-use planning and building control processes?

A.13. What is the role of civil society and stakeholders in relation to CML identification and implementation?

A.14. What are potential policy alternatives for the use of CMLs in order to reduce risk to coastal infrastructure?

B. GIS related questions

B.1. Do the provincial/municipal entities have the adequate technicians/staff to delineate and implement CMLs?

B.2. How important is GIS/GIT as a tool for the development of Coastal Management Lines?

B.3. Describe the role of GIS/GIT in the entire Coastal Management Lines development process?

B.4. Is data quality and data availability a problem in developing Coastal Management Lines? In situations where it applies, how is the conflict between accuracy and “tolerance”/error managed?

B.5. What are potential alternatives spatial representations i.e. “absolute”/static lines to delineate risk?

Annex 4. Bibliographic production elaborated in co-authorship, related to the topic of the thesis.

Peer Reviewed Journal Articles

Fernandes, A., Figueira de Sousa, J., Brito, S. S., Neves, B., & Vicente, T. (2018). Preparing Waterfront Brownfields Redevelopment for Climate Change: The Water City Project, Almada (Portugal). *Journal of Coastal Research*, *2*(Special Issue No. 85), 1531–1535. https://doi.org/10.2112/SI85-307.1

Book of Proceedings

Brito, S. S., Fernandes, A., Neves, B., Encarnação, S., & Ibraeva, A. (2017). A requalificação de frentes de água e as alterações climáticas: Considerações a propósito da intervenção do Cais do Sodré, Lisboa. *As dimensões e a responsabilidade Social da Geografia*, 297–300. Faculdade de Letras, Universidade do Porto: Faculdade de Letras da Universidade do Porto, Associação Portuguesa de Geógrafos.

Fernandes, A., & Neves, B. (2017a). As frentes ribeirinhas do estuário do tejo e as alterações climáticas: A abordagem dos instrumentos de gestão territorial. *International Conference Risks, Security and Citizenship*, 98–110. Setúbal, Portugal: CM-Setúbal, IGOT.

Neves, B., Fernandes, A., Julião, R. P., Rosendo, S., & Celliers, L. (2017c). Planeamento em regiões estuarinas em contexto de alterações climáticas: Análise comparativa dos casos de Portugal e África do Sul. *As dimensões e a responsabilidade Social da Geografia*, 281–284. Faculdade de Letras, Universidade do Porto: Faculdade de Letras da Universidade do Porto, Associação Portuguesa de Geógrafos.

Neves, B., Fernandes, A., Julião, R. P., Rosendo, S., & Celliers, L. (2018b). Considerações sobre o envolvimento de stakeholders em processos participativos de planeamento em zonas costeiras. *Península Ibérica No Mundo: Problemas e Desafios Para Uma Intervenção Ativa Da Geografia*, 1137–1145.

Neves, B., Pires, I. M., Fernandes, A., Julião, R. P., Rosendo, S., Celliers, L., & Craveiro, J. L. (2018b). Desafios à adaptação em zonas costeiras: O papel dos stakeholders e a disponibilização de informação. *Proceedings. Circular Economy. Urban Metabolism and Regional Development: Challenges for a Sustainable Future*, 29–34.

Neves, B., Rebelo, C., & Rodrigues, A. M. (2013). Modelling Sea-Level Rise in the Lisbon city coastal area, using Free and Open Source Technologies. *VII Jornadas de SIG Libre*, 11.

Neves, B., & Rodrigues, A. M. (2015a). Identificação e análise de dinâmicas populacionais em Portugal Continental com recurso a imagens de satélite DMSP/OLS. In Maria José Roxo, Rui Pedro Julião, Margarida Pereira, & Daniel Gil (Eds.), *Os Valores da Geografia. Atas do X Congresso da Geografia Portuguesa* (pp. 389–394). Lisboa, Portugal: Associação Portuguesa de Geógrafos.

Ventura, C., Fernandes, A., Neves, B., & Vicente, T. (2017b). Ordenamento do Território e Alterações Climáticas: Considerações sobre as estratégias e práticas de adaptação em regiões estuarinas. *Intellectual Capital and Regional Development: New Landscapes and Challenges for Planning the Space*, 1261–1267.

Book of Abstracts

Brito, S., Fernandes, A., Figueira de Sousa, J., Encarnação, S., & Neves, B. (2017). Adaptação às alterações climáticas em espaços portuários: Considerações sobre o caso do Porto de Sines. *Mares e Litorais: perspetivas transdisciplinares*, 26. Sesimbra, Portugal.

Fernandes, A., & Neves, B. (2017b). As frentes ribeirinhas do Estuário do Tejo e as alterações climáticas: A abordagem dos instrumentos de gestão territorial. *International Conference Risks, Security and Citizenship Proceedings*, 19–20.

Fernandes, A., & Neves, B. (2017c). Estratégias de adaptação às alterações climáticas em regiões estuarinas: Que agendas e medidas no domínio do planeamento e gestão do território? O caso do estuário do Tejo. In Luciano Lourenço (Ed.), *Risks and Education* (p. 255). Coimbra, Portugal: Simões & Linhares.

Fernandes, A., Neves, B., Ventura, C., Vicente, T., & Brito, S. (2017). Adaptação à subida do nível médio do mar em regiões estuarinas: O caso do Estuário do Tejo. *Mares e Litorais: perspetivas transdisciplinares*, 15. Sesimbra, Portugal.

Neves, B., & Celliers, L. (2015). The utility of DMSP/OLS Night Lights satellite imagery to track the evolution of urban dynamics in the Western Indian Ocean. *Western Indian Ocean Marine Science Association Scientific Symposium*, 151. Eastern Cape, South Africa.

Neves, B., Fernandes, A., Julião, R. P., Rosendo, S., & Celliers, L. (2017a). *Metodologias para a delimitação de linhas de gestão costeira nos instrumentos de planeamento e ordenamento do território em Portugal: O caso do estuário do Tejo*. 3–4. Porto, Portugal: Faculdade de Engenharia da Universidade do Porto.

Neves, B., Fernandes, A., Julião, R. P., Rosendo, S., & Celliers, L. (2017b). O Ordenamento do Território e as Alterações Climáticas: Considerações sobre o processo de adaptação em zonas costeiras. In Francisco Taveira Pinto (Ed.), *4ª Conferência sobre Morfodinâmica Estuarina e Costeira | MEC2017* (pp. 3–4). Porto, Portugal: FEUP.

Neves, B., Fernandes, A., Julião, R. P., Rosendo, S., & Celliers, L. (2018a). Considerações sobre o envolvimento de stakeholders em processos participativos de planeamento em zonas costeiras. *Península Ibérica no Mundo: problemas e desafios para uma intervenção ativa da Geografia*, 430–431.

Neves, B., Pires, I. M., Fernandes, A., Julião, R. P., Rosendo, S., Celliers, L., & Craveiro, J. L. (2018a). Desafios à adaptação em zonas costeiras: O papel dos stakeholders e a disponibilização de informação. *Abstracts Book and Program. Circular Economy. Urban Metabolism and Regional Development: Challenges for a Sustainable Future*, 18. Lisbon, Portugal: FCSH, APDR.

Neves, B., & Rodrigues, A. M. (2015b). Identificação e análise de dinâmicas populacionais em Portugal Continental com recurso a imagens de satélite DMSP/OLS. In M. J. Roxo (Ed.), *Valores da Geografia* (p. 52). Lisboa, Portugal: FCSH/UNL – Faculdade de Ciências Sociais e Humanas, Universidade Nova de Lisboa.

Ventura, C., Fernandes, A., Neves, B., & Vicente, T. (2017a). Ordenamento do Território e Alterações Climáticas: Considerações sobre as estrategias e práticas de adaptação em regiões estuarinas. *Intellectual Capital and Regional Development: New landscapes and Challenges for space planning*, 82–83. Universidade da Beira Interior, Covilhã: Associação Portuguesa de Desenvolvimento Rural.

Presentations

Brito, S., Fernandes, A., Figueira de Sousa, J., Encarnação, S., & Neves, B. (2017, September). *Adaptação às alterações climáticas em espaços portuários: Considerações sobre o caso do Porto de Sines*. Presented at the VII Encontro da Rede BRASPOR 'Mares e Litorais: perspetivas transdisciplinares', Sesimbra, Portugal.

Brito, S., Fernandes, A., Neves, B., Encarnação, S., & Ibraeva, A. (2017, November). *A requalificação de frentes de água e as alterações climáticas: Considerações a propósito da intervenção do Cais do Sodré, Lisboa*. Presented at the XI Congresso da Geografia Portuguesa 'As dimensões e a responsabilidade social da Geografia', Faculdade de Letras da Universidade do Porto.

Brito, S., Fernandes, A., Neves, B., Ibraeva, A., & Encarnação, S. (2017, October). *Planning urban waterfronts for climate change: Essay on the case of the city of Lisbon*. Presented at the II Congreso Internacional de Ordenación Territorial y Gestión Ambiental, Cáceres, Spain.

Fernandes, A., & Neves, B. (2017a, March). *As Frentes Ribeirinhas do Estuário do Tejo e as Alterações Climáticas: A Abordagem dos Instrumentos de Gestão Territorial*. Presented at the International conference Risks, Security and Citizenship (ICRSC), Setúbal, Portugal.

Fernandes, A., & Neves, B. (2017b, May). *Estratégias de adaptação às alterações climáticas em regiões estuarinas: Que agendas e medidas no domínio do planeamento e gestão do território? O caso o estuário do Tejo*. Presented at the IV Congresso Internacional de Riscos 'Riscos e Educação', Faculdade de Letras da Universidade de Coimbra.

Fernandes, A., Neves, B., Ventura, C., Vicente, T., & Brito, S. (2017, September). *Adaptação à subida do nível médio do mar em regiões estuarinas: O caso do Estuário do Tejo*. Presented at the VII Encontro da Rede BRASPOR 'Mares e Litorais: perspetivas transdisciplinares', Sesimbra, Portugal.

Mansini, A., Neves, B., Dias, C., Gabriel, D., & Aguiar, P. (2012, June). *Maritime Spatial Planning, Need for a Spatial Management Plan in the Northern Adriatic Sea*. Presented at the LLP Erasmus Intensive Programme on Maritime Spatial Planning – MSP, Università Iuav di Venezia, Italy.

Neves, B. (2014b, July). *PhD Proposal – Sea Level Rise and Climate Change*. Presented at the Research meeting, CSIR, Durban, South Africa.

Neves, B. (2015, September). *From coastal defence to coastal adaptation. The role of coastal boundary lines in coastal management plans: A comparative study between Portugal and South Africa - PhD projects discussion*. Presented at the PhD peer group research discussion, 1st meeting, CSIR, Durban, South Africa.

Neves, B., Fernandes, A., Julião, R. P., Rosendo, S., & Celliers, L. (2017a, May). *O ordenamento do território e as alterações climáticas: Considerações sobre o processo de adaptação das zonas costeiras*. Presented at the 4ª Conferência sobre Morfodinâmica Estuarina e Costeira, Faculdade de Engenharia da Universidade do Porto.

Neves, B., Fernandes, A., Julião, R. P., Rosendo, S., & Celliers, L. (2017b, November). *Planeamento em regiões estuarinas em contexto de alterações climáticas: Análise comparativa dos casos de Portugal e África do Sul*. Presented at the XI Congresso da Geografia Portuguesa 'As dimensões e a responsabilidade social da Geografia', Faculdade de Letras da Universidade do Porto.

Neves, B., Gabriel, D., Vaz Medeiros, J., Maria Almeida, P., & Rodríguez, O. (2012, August). *Coastal Environment Planning, The case study of Ribeira Quente*. Presented at the 2nd Advance International Summer School on GIS and Islands, Climate Change and Coastal Environmental Planning, Universidade dos Açores, Ponta Delgada, São Miguel.

Neves, B., Rebelo, C., & Rodrigues, A. M. (2013, March). *Modelling Sea-Level Rise in the Lisbon city coastal area, using Free and Open Source Technologies*. Presented at the VII Jornadas de SIG Libre 'Servei de Sistemes D'Informació Geogràfica I Telederecció', Universitat de Girona, Spain.

Neves, B., & Rodrigues, A. M. (2015, September). *Identificação e análise de dinâmicas populacionais em Portugal Continental com recurso a imagens de satélite DMSP/OLS*. Presented at the X Congresso da Geografia Portuguesa 'Os Valores da Geografia', Faculdade de Ciências Sociais e Humanas, Universidade NOVA de Lisboa.

Ventura, C., Fernandes, A., Neves, B., & Vicente, T. (2017). *Ordenamento do Território e Alterações Climáticas: Considerações sobre as estratégias e práticas de adaptação em regiões estuarinas*. Presented at the 24th APDR Congress 'Intellectual Capital and Regional Development: New landscapes and challenges for space planning', Universidade da Beira Interior, Covilhã.

Posters

Neves, B. (2012, August). *Sea Level Rise and Climate Change in the city of Lisbon. Its consequences at a social level, land use/occupation, services and infrastructures*. Poster presented at the 2nd Advance International Summer School on GIS and Islands, Climate Change and Coastal Environmental Planning, Azores University, Ponta Delgada, Portugal.

Neves, B., & Celliers, L. (2015, October). *The utility of DMSP/OLS Night Lights satellite imagery to track the evolution of urban dynamics in the Western Indian Ocean*. Poster presented at the 9th Western Indian Ocean Marine Science Association Scientific Symposium, Eastern Cape, South Africa.