Governance Challenges for the Adaptation to Sea Level Rise in the Canary Islands: A Multilevel Approach

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Appendix

Policy/Instrument	Aims (Climate Change/Adaptation to Sea Level Rise)	Governance Tools	Expected Outcomes
European level			
UN 2030 Agenda for Sustainable Development	Promote climate action (SDG 13), sustainable oceans (SDG 14), and resilient infrastructure (SDG 9).	Sustainable Development Goals (SDGs), national implementation plans, global monitoring framework.	Climate-resilient societies, reduced vulnerability to sea level rise, enhanced international cooperation.
United Nations Convention on the Law of the Sea (UNCLOS)	Ensure sustainable use and protection of marine environments in the face of rising seas and climate impacts.	Legal framework for maritime zones, obligations for marine environmental protection, dispute resolution.	Legal clarity on maritime boundaries affected by sea level rise, better ocean governance.
Maritime Spatial Planning Directive (2014/89/EU)	Adapt maritime space use to climate impacts and support sustainable blue growth.	Mandatory maritime spatial plans, stakeholder engagement, cross-border cooperation.	Climate-adaptive marine planning, reduced conflicts at sea, integrated climate resilience in maritime uses.
Marine Strategy Framework Directive (2008/56/EC)	Achieve Good Environmental Status (GES) of marine waters, considering climate and sea level impacts.	Marine strategies, environmental assessments, monitoring programs, corrective measures.	Healthier marine ecosystems, better preparedness for climate change and sea level rise impacts.
EU Strategy on Adaptation to Climate Change (2021)	Strengthen adaptation capacity and reduce climate-related risks, including from rising sea levels.	Climate risk assessments, adaptation strategies, EU funding instruments (e.g., LIFE, Horizon Europe).	Increased resilience of coastal areas, better-informed planning, minimized socio-economic losses.
Spanish level			

Law 22/1988 on Coasts	Preserve the public maritime-terrestrial domain and adapt coastlines to environmental changes.	Coastal protection zoning; prohibition of new developments in risk areas; shoreline demarcation.	Reduced coastal vulnerability; better preservation of natural buffers; space for coastal retreat.
Law 2/2013 on the Protection and Sustainable Use of the Coast	Update and reinforce coastal zone protection considering climate impacts.	Coastal sustainability criteria; updated demarcations; monitoring of erosion and climate risks.	Sustainable coastal use; improved adaptation to sea level rise and erosion; legal clarity for land use.
Law 26/2007 on Environmental Liability	Prevent and repair environmental damage, including from climate-exacerbated events.	"Polluter pays" principle; mandatory risk prevention and insurance systems.	Better environmental risk management; accountability for damage linked to climate change impacts.
Law 21/2013 on Environmental Assessment	Ensure that projects and plans incorporate environmental and climate risk analysis.	Environmental Impact Assessments (EIA); Strategic Environmental Assessments (SEA); climate risk screening.	Avoidance of maladaptation; more resilient infrastructure; improved integration of sea level risks.
Law 7/2021 on Climate Change and Energy Transition	Reduce emissions and promote adaptation, especially in vulnerable areas like coasts.	Climate risk maps; mandatory adaptation plans; long-term climate planning at national and local levels.	Enhanced coastal resilience; climate-informed planning; alignment with EU climate targets.
PNACC 2021–2030 (National Climate Change Adaptation Plan)	Coordinate national adaptation to climate impacts, focusing on vulnerable systems and territories.	Sectoral adaptation guidelines; climate risk indicators; coastal action lines.	Systematic national adaptation; anticipatory management of sea level rise; informed decision-making.
Organic Law 1/2018 on the Statute of Autonomy of the Canary Islands	Protect the Canary Islands' environment and recognize climate vulnerability.	Regional legislative powers over coastal and climate policy; integration of adaptation into planning.	Stronger climate governance at regional level; tailored adaptation to island-specific risks.
Canary Islands (regional) level			
Organic Law 1/2018 on the Statute of Autonomy of the Canary Islands	Establish regional authority to address environmental challenges and climate risks.	Autonomous legislative powers on climate and coastal management; integration of sustainability in governance.	Stronger regional climate governance; tailor-made responses to sea level rise and insular vulnerability.

Law 14/2014 on Harmonisation and Simplification in the Protection of the Territory and Natural Resources	Streamline environmental protection while enabling sustainable development.	Land-use and natural resource planning instruments; environmental permits; simplified procedures.	Better alignment of land use with climate adaptation needs; reduced administrative barriers for climate-resilient projects.
Law 4/2017 on Land and Protected Natural Spaces of the Canaries	Protect natural areas and promote climate-resilient land use.	Territorial Planning Guidelines; Zoning of protected areas; integration of climate risks into spatial plans.	Preservation of natural buffers (e.g. dunes, wetlands); climate-conscious land management.
Law 6/2022 on Climate Change and Energy Transition in the Canary Islands	Mitigate emissions and promote adaptation across sectors, especially coastal and insular areas.	Climate change governance system; GHG reduction targets; adaptation obligations for public entities.	Reduced climate vulnerability; mainstreaming of adaptation; cleaner energy system.
Decree-Law 4/2023 (Amendment of Law 6/2022)	Strengthen the legal framework for climate governance and accelerate implementation.	Adjusted deadlines and targets; increased scope of climate action instruments.	Improved implementation capacity; more responsive adaptation mechanisms.
Canary Islands Climate Action Strategy 2030	Set long-term vision for climate mitigation and adaptation, aligned with EU and Spanish goals.	Strategic objectives and sectoral lines of action (water, coasts, energy, biodiversity).	Coordinated and ambitious regional response to climate and sea level threats.
Canary Islands Climate Action Plan	Operationalize the Climate Action Strategy through concrete measures and timelines.	Specific measures, responsible entities, funding lines, performance indicators.	Effective implementation of adaptation projects; measurable resilience outcomes across the archipelago.
Island level			
Island Spatial Plans (PIOs)	Integrate sustainable territorial development and climate resilience into island-wide planning. Address risks from coastal erosion, sea level rise, and extreme weather events.	Legally binding spatial plans for each island; zoning regulations; environmental assessments; mandatory consideration of climate risks; coordination with municipal/local plans (PGOs).	Climate-resilient land use; protected coastal zones; reduced exposure of infrastructure to sea level rise; harmonization between development and environmental protection.

- ***Example (island used as example in the figure 2): Island Spatial Plan of Gran Canaria island (PIO-GC).***	1. Ensure sustainable territorial development.	1. Coastal zoning with risk-based setbacks.	1. Reduced exposure of people and assets to marine risks.
	2. Prevent and mitigate risks associated with coastal erosion, marine flooding, and sea level rise.	2. Hazard maps identifying vulnerable coastal areas.	2. Preserved natural coastal systems that support adaptation.
	3. Protect natural systems that act as climate buffers (e.g., dunes, ravines, wetlands).	3. Land-use restrictions in flood-prone and erosion-risk zones.	3. territorial planning aligned with Climate resilience and sustainable development.
		4. Integration with municipal planning (PGOs) and Canary Islands Climate Action Plan.	
		5. Environmental Assessment aligned with Law 21/2013.	
Municipal level			
Municipal General Urban Plans (PGOUs)	Integrate climate change adaptation into urban planning.	Climate risk zoning.	Reduced vulnerability of urban areas to flooding and sea level rise.
	Protect coastal areas and ecosystems.	Coastal setback regulations, ecological corridors.	Conservation of biodiversity and natural barriers against sea-level rise.
	Avoid urban development in high-risk flood zones.	Land use restrictions, updated floodplain maps.	Prevention of property damage and population exposure to flooding.
	Promote sustainable infrastructure and resilient urban design.	Green-blue infrastructure plans, permeable surfaces, elevation requirements.	Increased resilience of infrastructure to climate impacts.
	Encourage renewable energy and low-emission mobility.	Urban mobility plans (PMUS), energy efficiency regulations.	Reduced urban greenhouse gas emissions.

	Foster public awareness and participation in climate resilience strategies.	Public consultation processes, environmental education initiatives.	Informed and engaged communities capable of contributing to climate adaptation.
	Ensure coordination with regional and national climate policies.	Alignment with Canary Islands Climate Change Strategy and Spanish Climate Change Law.	Coherent and efficient implementation of climate adaptation and mitigation measures.
- ***Example: Municipal General Urban Plan (PGOU) of Mogán (Gran Canaria)***	1. Minimize exposure of urban and touristic areas to sea-level rise and coastal erosion.	1. Coastal zoning based on risk exposure maps; setback limits; prohibition of new development in vulnerable areas	1. Increased protection of critical infrastructure and touristic zones
	2. Adapt infrastructure to future climate scenarios (heatwaves, storms, rising seas).	2. Implementation of climate-resilient building codes and drainage improvements	2. Long-term functionality of public and private infrastructure
	3. Conserve and restore coastal ecosystems as natural buffers.	3. Integration of green belts, protection of dunes, ravines, and marine-terrestrial transition zones	3. Enhanced natural resilience and ecosystem services against sea-level impacts
	4. Ensure sustainable tourism development in face of climate pressures.	4. Spatial regulation of touristic areas, density control, and promotion of energy-efficient facilities	4.Climate-resilient tourism economy and reduced environmental impact
	5. Align land use planning with regional climate strategies (Canarias & Spain)	5. Integration with Canary Islands Climate Strategy and national Flood Risk Management Plans (PGRI)	5. Coordinated governance and funding access for adaptation measures
	6.Raise awareness in the local population and stakeholders	6. Participation mechanisms in PGO updates; climate risk communication strategies	6. Empowered local community engaged in mitigation and adaptation efforts