CTCN Technical Assistance

Request Submission Form

Requesting country:	*Uruguay*

Request title:	*Development of technological tools to evaluate impacts, vulnerability and adaptation to climate change in Uruguay's coastal areas.*

Contact information:

	National Designated Entity	**Request Applicant**
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Technology Needs Assessment (TNA):

☐ *The requesting country has conducted a TNA*
☒ *The requesting country is currently conducting a TNA*
☐ *The requesting country has never conducted a TNA*

Geographical focus:

☐ *Community*
☒ *Subnational*
☐ *National*
☐ *Multi-country*

The proposal covers the coastal areas of six departmental governments in Uruguay (Colonia, San José, Montevideo, Canelones, Maldonado and Rocha), representing the whole coastal region of the Río de la Plata ("River Plate") and the Atlantic Ocean.

Theme:

- ☒ *Adaptation to climate change*
- ☐ *Mitigation to climate change*
- ☐ *Combination of adaptation and mitigation to climate change*

Sectors:

The main sectors the proposal relates to are: ecosystems/biodiversity, coastal zones, infrastructure, urban areas, tourism, disaster reduction, planning and governance.

Problem statement *(up to one page):*

Over the course of its history, the coastal areas of Uruguay have played a significant role in the country's development. Uruguay's coastline is 670 km long, 450 km of which corresponds to the Río de la Plata and the remaining 220 km to the Atlantic Ocean. The coastal departments (Colonia, San José, Montevideo, Canelones, Maldonado and Rocha) currently account for some 70 per cent of the total population, 71 per cent of private households and a little more than 72 per cent of housing in Uruguay. In addition, they contribute 75 per cent of the country's GDP and most of the places identified in the coastal areas (59 per cent) are predominantly involved in tourism.

Recent regional studies conducted for Latin America and the Caribbean (Reguero et al, 2015) demonstrate that the incidence of extreme sea levels increased between 1950 and 2008, with a greater magnitude and frequency being noted in the coastal areas of the Caribbean and Río de la Plata, with Montevideo specifically being classified as one of the continent's most exposed cities. Sudden flooding has occurred in Río de la Plata due to a combination of meteorological and hydrological effects (Verocai et al, 2014), the simultaneous occurrence of extra-high high tides alongside large, atmospherically-induced storm surges having raised the mean sea level (MSL) by as much as three metres above its usual height (0.91 m), leading to the stripping of beaches and dunes, damage to coastal infrastructure and risks to navigation. Extreme events (> 2.5 m high) occur once in 11 months, principally during the spring and autumn (Verocai et al, 2014).

Among the current coastal processes, it is possible to ascertain that erosion due to changes in the climate pattern of waves and the action of winds - extreme events - is causing the coastline to recede. In turn, the change in MSL, analysed on the basis of national records dating from 1934, shows an incremental trend upward. Future climate scenarios (rainfall, temperature) suggest an increase in discharge volumes. It was also shown that inter-annual fluctuations in MSL are associated with the variability of these flow rates, related largely to the "El Niño" (positive deviations) and "La Niña" (negative deviations) events.

Given global and regional climate forces – contribution of continental waters coming from the Río de la Plata Basin, increased MSL, changes detected in swell and wind patterns – we can deduce that there will be increased coastal vulnerability in the short term and that the impact in terms of loss of infrastructure, effect on ecosystems and their biodiversity and salinization of coastal aquifers may be very high. Economic assessments of the cost of a possible one-metre rise in MSL put the losses and damage at 10.9 per cent of the country's GDP (baseline 2006). The urban areas affected would account for almost half of this total and the effect on infrastructure in terms of ports, sanitation and roads would account for 19 per cent of the total economic impact.

It has been calculated that once the erosion begins to have an impact in terms of the loss of private lands (Canelones), property devaluations of between 53 and 58 per cent may be incurred, even resulting in the lands being unsaleable (Piaggio, 2014).

The country has produced a National Climate Change Response Plan which highlights the importance of accurately identifying the impacts, vulnerabilities and adaptation measures necessary for the coastal sector. Work has been under way since 2005 to include these issues on the agendas of the departmental governments; six of these authorities are currently formulating climate change and variability adaptation plans, for imminent implementation. However, in this context the main barriers to adaptation to climate variability and change in coastal areas lie in the limited or complete lack of availability of:

1. *Institutional capacity, at both the national and local levels, to implement adaptation measures associated with extreme events and MSL increases, due to a lack of robust, organized information on dynamic coastal processes.*
2. *Database of marine dynamics (MSL, sea swell, meteorological tides) with high spatial and temporal resolution adapted to the Río de la Plata and southern region of the south-west Atlantic.*
3. *Methodologies and techniques for the production of high temporal and spatial resolution digital databases for the maritime climate.*
4. *Techniques for improved resolution (downscaling) and classification in order to manage databases (predictions/projections; dynamic and statistical downscaling).*
5. *Systematic identification of impacts of flood events both along the estuarine and oceanic coastlines.*
6. *System of indicators for monitoring and evaluating adaptation to climate variability and change in the coastal areas of Uruguay, for application locally in the land-use planning and sustainable development tools.*

Development of the above elements and removal of the identified barriers is essential for implementation of the National Plan for Coastal Adaptation and the design of the National Climate Change Policy.

Past and ongoing efforts *(up to half a page):*

2010–2015. *"Implementing pilot climate change adaptation measures in coastal areas of Uruguay" project. UNDP-GEF URU/07/G32. http://mitecnico.com.uy/G2324/?page_id=4939*

2012. *Climate Plan for the Metropolitan Region of Uruguay. "Local Climate Change. Developing Local Climate Resilience and Low Carbon Emissions in the Departments of Canelones, Montevideo and San José" project. URU/09/003*

2013. *National Portfolio of Climate Change Adaptation and Mitigation Projects. Operational Instrument of the National Climate Variability and Change Response Plan. Process of formation, content and strategic projects. 2012–2013 UNDP – Project K Economic "Vulnerability and Sustainability at the Local Level"*

2014*. Building national climate change adaptation capacities in coastal areas. Specific agreement between the University of the Republic (UdelaR) and the Ministry of Housing, Land Planning and Environment (MVOTMA): "Planning Coastal Adaptation to Climate Change". Output 2: Methodology for mapping urban infrastructure and structures vulnerable to climate variability and change. Output 3: Study of baseline of activities, projects and financing of coastal actions. Output 4: Study of the local capacities of the departmental governments. Output 5: Mapping of urban infrastructures and structures vulnerable to climate variability and change. Output 6: Formulation of the Strategic Coastal Adaptation Programme.* http://mitecnico.com.uy/G2324/?page_id=4939

2015*. Climate Change Division. Report and preliminary results from the workshop to identify and prioritize climate change adaptation projects in coastal areas of Uruguay. MVOTMA, 8 pp.*

http://mitecnico.com.uy/G2324/?page_id=4939

2015. *Preliminary proposal for a National Coastal Adaptation Plan. Executive Summary of the Proposal. Climate Change Division, MVOTMA, 7 pp. http://mitecnico.com.uy/G2324/?page_id=4939*

Assistance requested *(up to one page)*:

The ultimate goal of this assistance is to establish the vulnerability to and impact of climate variability and change on coastal areas of Uruguay. More particularly, the main objective is to analyse and assess the effects on the dynamic of beaches, dunes, coastal erosion, risk of flooding and harm to ecosystems, infrastructure and the population living along the coast, as well as to productive activities such as tourism.

In this context, the aim of the requested technical assistance will be the technological transfer of tools that have been developed on the effects of climate change on coasts so that they can be applied in the adaptation processes identified in Uruguay. More specifically, the instrument applied by ECLAC and developed by the Environmental Hydraulics Institute of the University of Cantabria can be mentioned, which analyses the effects of climate change on the coastal areas of Latin America (2012). This will enable the country's transition to integrated coastal zones management, which will contribute to human well-being and to the economic development of the tourism sector. The Uruguayan Government has set itself the target of developing a National Adaptation Plan (NAP) for coastal areas based on the outputs obtained from applying the technology developed with the CTCN's technical assistance. The results will also have a direct and positive impact on the design and implementation of the National Climate Change Policy, which will be designed jointly by the institutions during 2016, as part of the National Climate Change Response System. It will also include subnational adaptation aspects, such as those of the coastal strip linked to the NAP.

In order to achieve the overall objective, the following specific objectives have been set:

1. *Establish the changes occurring in the marine dynamic in recent decades (sea level, sea swell, wind, meteorological tides).*
2. *Based on climate change scenarios, estimate the foreseeable future changes in the marine dynamic.*
3. *Assess the effects that these changes in the marine dynamic may have on the different natural environments and human uses of the coast.*
4. *Conduct a climate change risk assessment across different temporal horizons and for different geographic or socioeconomic receptors.*
5. *Propose adaptation strategies and alternatives.*
6. *Establish the foundations for subsequent studies aimed at covering other aspects not considered in this study.*
7. *Develop the tasks of technological transfer, training and education associated with the project.*
8. *Generate indicators of impact, vulnerability and adaptation to climate change in the coastal zone.*

Expected benefits *(up to half a page):*

It is expected that the transfer of technology received through the CTCN's technical assistance will generate information of high spatial and temporal resolution along with detailed studies for coastal areas that are of special strategic importance to the country. To date, Uruguay has selected a number of priority sites that have been endorsed by the local governments. This transfer of technology will help local governments to generate projects along the coast, will improve their capacity to access national and international funds and will enable implementation of adaptation measures in the short term.

In principle, the aim is to submit at least three detailed projects during the 2016-2017 period that consider different spatial scales, in line with the priorities noted in the NAP. These scales will cover departmental and regional aspects:

- *Stretches of coastline of between 30 and 50 km with a spatial resolution of approximately 25 m for analysis. In this case, the study will need to enable the identification of vulnerable coastal ecosystems and infrastructure (beaches, dunes, river mouths, ports, urban settlements, tourist resorts).*
- *Stretches of coastline of around 500 km with a spatial resolution of between 5 and 10 km. In this case, the resolution will need to be lower than before and so the characterization of the different relevant coastal elements will depend on the part of the coastline, its geography and the information available in the country.*
- *The level of detail that needs to be achieved in this kind of study will require the cooperation of the country's various authorities and research bodies. This involvement will need to be formalized during the preparatory stages of the Response Plan, particularly in relation to providing the data that will be used to identify the vulnerability of the coastal area (see table of main stakeholders). This exchange will not only strengthen institutional capacities to manage information for decision-making but will also generate a management network for top-down/bottom-up adaptation.*
- *The country's academic institutions will have a tool which, in the future, could be improved and adapted for the identification of impacts, assessment of vulnerabilities, risk management and implementation of adaptation measures for Uruguay's coastal areas.*

Post-technical assistance plans *(up to half a page)*:

As beneficiary country, Uruguay will have a database of variables associated with the marine dynamic (wind, pressure, sea swell, meteorological tides, sea level, etc.) and this will include high-resolution temporal information (1940-2100). The data will be calibrated and contrasted with the instrumental information available in the country. It will thus become a baseline for many other high-interest applications such as integrated coastal zones management, operational oceanography, infrastructure construction, risk management in coastal areas, ecosystem resilience and tourism management. It will also provide information for different scenarios with the same variables and across different horizons (2030, 2050, 2100).

The country will have a database of indicators of trends in variables as well as a database of indicators of impact that can be used to prioritize action strategies.

Uruguay will have a methodology and high-resolution output with which to establish the climate change risk in coastal areas. It will also be possible to use this to contribute to sustainable coastal zones management.

The country's technological training and capacity will be improved both at the level of academia and of the national/local governments and private sector.

The results will be incorporated into the design and implementation of the National Climate Change Policy. In general, processes to incorporate the technology and general results will be included in the main aspects of the adaptation approach. More specifically, the results will be incorporated into the specific design and implementation of strategies and concrete adaptation actions in Uruguay's coastal areas.

Key stakeholders:

Stakeholder	Role to support the implementation of the assistance
Climate Change Division, MVOTMA	*Project leader, partner and main hub for inter-institutional coordination.* *Promotion of training bodies at the national/local government level and in the private sector.*
National Climate Change Response System, under MVOTMA	*Space for inter-institutional coordination with all related parties, both as providers of information and users of results.*

The following are some of the institutions that could potentially be involved in the project:

- National Environment Department, MVOTMA

- National Land Planning Department, MVOTMA

- Coastal and Marine Management Department, MVOTMA

- National Water Department, MVOTMA

- Uruguayan Meteorological Institute

- Naval Oceanography, Hydrography and Meteorology Department, Ministry of National Defence (MDN)

- National Hydrography Department, Ministry of Transport and Public Works /MTOP

- Ministry of Tourism

- National Emergencies System, Presidency of the Republic

- Office of Planning and Budgets, Presidency of the Republic

- Departmental governments of Colonia, San José, Montevideo, Canelones, Maldonado, Rocha and the Metropolitan Agenda Programme of the Presidency of the Republic

- University Centre of the East, Interdisciplinary Centre for Integrated Coastal Management, UdelaR

- Physics Institute, Department of Atmospheric Sciences, Faculty of Science, UdelaR

- Institute of Fluid Mechanics and Environmental Engineering, Faculty of Engineering, UdelaR

Alignment with national priorities *(up to half a page)*:

Ministry of Housing, Land Planning and Environment

1. *Programme of General Mitigation and Adaptation to Climate Change Measures in Uruguay. 2004 pp. 16-17. http://www.cambioclimatico.gub.uy/images/stories/documentos/marco_legal/publicaciones/pmegema_in g.pdf*
2. *Proposed National Adaptation to Climate Change Plan. Coastal Sector.* http://mitecnico.com.uy/G2324/?page_id=4939
3. *Guidelines for the normalization and systematization of territorial and bibliographic information 2014. Vol.1: Pages 7, 3, 42. Vol.2: Pages 7, 25, 37. http://www.mvotma.gub.uy/ambiente-territorio- y-agua/gestiona/ordenamiento-del-territorio.html*

National Climate Change Response System

4. *Decree No 238/09 of 20 May 2009. Decree creating the National Climate Change and Variability Response System, on the effects of coordinating and planning the public and private actions necessary for risk prevention, and climate change mitigation and adaptation. MVOTMA page 24*

https://w.presidencia.gub.uy/normativa/decretos/decretos-05-2015

5. *Climate Plan for the Metropolitan Region. Coastal sector p. 115.* archivo.presidencia.gub.uy/***metropolitana***/docs/***plan_climatico***.pdf
6. *National Climate Change Response Plan. Assessment and strategic outlines. 2010. Chapter III item 3.3.3 p. 44; Chapter V item 5.1 p. 62.* www.cambioclimatico.gub.uy/index.php/documentos/otras-publicaciones.html
7. *Uruguay's Intended Nationally-Determined Contributions to the UNFCCC*
   http://www4.unfccc.int/submissions/INDC/Published%20Documents/Uruguay/1/INDC%20Uruguay%20espa%C3%B1ol.pdf

Ministry of Transport and Public Works

8. *Decree of 29 May 2015.* Creating an area of work responsible for proposing an integrated policy to address the phenomena affecting the coast, which is suffering at various points in the national territory. https://w.presidencia.gub.uy/normativa/decretos/decretos-05-2015

Ministry of Tourism http://www.mintur.gub.uy/index.php/es/politicas/turismo-y-cambio-climatico

9. *Tourism and climate change in the policy for implementing adaptation and mitigation measures.*

National Emergencies System http://sinae.gub.uy

10. *Law No. 18,621 - Creating the National Emergencies System (SINAE), a permanent public system with the aim of protecting people, significant assets and the environment from the possible or real occurrence of disaster situations through the joint coordination of the State with the adequate use of available public and private resources aimed at encouraging the conditions for sustainable national development.*

ECOPLATA

11. *This programme to manage dune erosion and sedimentation is being implemented through the National Environment Department (DINAMA/MVOTMA). The overall objective is to contribute to generating protective and mitigating measures and management plans with regard to coastal erosion and dune sedimentation at priority points along the Uruguayan coast. 2014–2016: "Geomorphology, vulnerability and responses to coastal erosion" Convention, p. 20.* http://www.ecoplata.org/noticia/documento-avances-de-la-gestion-costera-marina-2014/

Canelones departmental government http://www.comunacanaria.gub.uy/

12. *Organic Municipal Law No 9515, Art. 19, subparagraph 12*
13. *Departmental resolution 2692/2014 (file JDC 2014-200-81-01454; IDC 2014-81-1010-00325): approval of the strategic outlines of the Climate Plan for the Metropolitan Region.*
14. *COSTAPLAN - Strategic Plan for Land-use Planning associated with Climate Change.* http://www.cambioclimatico.gub.uy/index.php/plan-nacional/12-noticias/104-la-adaptacion-al-cambio-climatico-en-la-planificacion-territorial.html

Departmental government of Montevideo

15. *Organic Municipal Law No 9515, Art. 19, subparagraph 12*
16. *Departmental Resolution No 4125/10 of 13 September 2010. Establishing the Climate Change Working Group, coordinating information and proposals to implement adaptation measures in response to climate variability and change.* www.montevideo.gu.uy/institucional/resoluciones
17. *Departmental Resolution No 5042/12 of 16 November 2012. UNDP /IDM letter of agreement; Local Climate Change.* www.montevideo.gu.uy/institucional/resoluciones
18. *Montevideo and Climate Change. Policies and actions of the departmental government of Montevideo in response to climate change. 2010-2014.* http://www.montevideo.gub.uy/servicios-y- sociedad/limpieza-y-medio-ambiente/politicas-y-acciones-de-la-im-en-respuesta-al-cambio-climatico

Development of the request *(up to half a page)*:

The development of the request is part of the efforts to promptly implement pilot measures for coastal adaptation and draw up the National Plan for Coastal Adaptation. Both processes are being organized by the Climate Change Division of MVOTMA in the context of the inter-institutional coordination anticipated in the National Climate Change Response System.

This inter-institutional coordination has facilitated the implementation of adaptation measures in the coastal areas of Uruguay, coordinated between the national government and departmental governments. To date, 30 workshops have been organized and more than 15 national and international consultants hired to produce documents and reports that address the need for analysis of climate information, choice of adaptation measures and implementation of concrete actions in coastal areas. The process of implementing pilot measures has culminated in the national government, through MVOTMA, beginning the process of drafting a NAP focused on coastal areas (PNAC) while also intending to strengthen the country's climate services.

With regard to the PNAC, workshops were organized in October and November 2015. The main results of these will be adaptation projects produced for each of the country's six coastal departments. All the proposals submitted have recognized the need for adapted information to address current coastal processes, bearing in mind future climate change scenarios so that it is thus possible to implement sustainable adaptation measures. Moreover, on the basis of previous studies by academia, it can be seen that Uruguay needs a tool that can analyse the vulnerability of coastal areas as a whole. This, in turn, will enable approximations of local analyses to be made in order to address regional and sectoral impacts. Through its Subnational Development and Management Programme, the Planning and Budgeting Office of the Presidency of the Republic, together with the Ministry of Tourism, is supporting the process of producing adaptation projects for coastal areas, with the aim of providing national funds for their implementation. Improved management and use of climate, hydrological and oceanic information will result in the efficient implementation of the above-mentioned projects and help ensure that Uruguay has a strong PNAC from the outset.

In addition, a National Climate Change Policy is scheduled to be designed in 2016, in the context of the National Climate Change Response System. This will address the country's main challenges in terms of institutions, adaptation, mitigation and knowledge, all as part of a process to consolidate a low-carbon, climate-resilient model in which the process of transferring the technology and results achieved in this project can contribute significantly to addressing the impacts in one of the country's most vulnerable zones.

Expected time frame:

Two years

Background documents:

2004. *Second National Communication.* *http://www.mvotma.gub.uy/comunicaciones-nacionales.html*

2010. *Third National Communication.* *http://www.mvotma.gub.uy/comunicaciones-nacionales.html*

2010. *La economía del cambio climático en Uruguay. (The climate change economy in Uruguay)* *http://www.cepal.org/es/publicaciones/3800-la-economia- del-cambio-climatico-en-el-uruguay-sintesis*

2010. *Gómez-Erache M, Conde D, Villarmarzo R. Sostenibilidad de la Gestión Integrada en la zona costera del Uruguay. Conectando el conocimiento con la acción. (Sustainability of Integrated Management in Uruguay's Coastal Areas. Connecting knowledge with action.) EcoPlata Programme, Uruguay. 72 pp.* *www.ecoplata.org*

2011. *Cambio Climático y Turismo. Medidas de Adaptación y Mitigación. (Climate Change and Tourism. Adaptation and Mitigation Measures.)*http://www.mvotma.gub.uy/documentos.html

2012. *The NAP Process. A brief overview. LCD expert group, December 2012. United Nations; Framework Convention on Climate Change.*unfccc.int/resource/.../publication_**ldc**_napp_2012

2012. *ECLAC. Efectos del cambio climático en la costa de América Latina y el Caribe. (Effects of climate change on the Latin American and Caribbean Coast). Volume: Vulnerabilidad y exposición (Vulnerability and exposure); Volume: Efectos teóricos (Theoretical effects); Volume: Dinámicas, tendencias y variabilidad climática (Dynamics, trends and climate variability); Volume: Impactos (Impacts).* *http://www.cepal.org/es/publicaciones/3982-efectos-cambio-climatico-la-costa-america-latina-caribe-*

2013. *Nagy GJ, Gómez-Erache M, Kay R. A risk-based and participatory approach to assessing climate vulnerability in the coastal zone of Uruguay. In: Glavovic B et al (eds) Climate change and the coastal zone. Chapter 16, Spon Press / Taylor & Francis.*

2014. *Cinco años de respuestas ante los desafíos del cambio y la variabilidad climática en Uruguay. (Five years of responses to climate challenges and climate variability in Uruguay.)* *www.cambioclimatico.gub.uy*

2014. *INVERMAR, Grupo Laera, GCAP and CDKN (Eds.) Adaptación al cambio climático en ciudades costeras de Colombia. Guía para la formulación de planes de adaptación. (Adapting to Climate Change in Colombia's Coastal Towns. A guide to formulating adaptation plans). INVEMAR General Series of Publication No 65. Santa Marta. 40 pp.* *http://www.invemar.gov.co/publicaciones/-/asset_publisher/SfkbM8hfCgNW/content/adaptacion-al-cambio-climatico-en-ciudades-costeras-de-colombia-guia-para-la-formulacion-de-planes-de-adaptacion?inheritRedirect=false*

2014. Verocai J, Bidegain M and Nagy GJ. Nivel del mar y eventos extremos en las agues costeras del Río de la Plata y la costa oceánica uruguaya. (*Sea level and extreme events in the coastal waters of Río de la Plata and Uruguay's ocean coastline.)* In: Goso C Nuevas miradas a la problemática de los ambientes costeros. Sur de Brasil, Uruguay y Argentina. (*A new look at the problem of coastal environments. South of Brazil, Uruguay and Argentina.)* DIRAC, Faculty of Sciences. Montevideo, Uruguay.

2015. *Reguero BG, Losada IJ, Díaz-Simal P, Méndez FJ, Beck MW. Effects of climate change on exposure to coastal flooding in Latin America and the Caribbean. PLOS-One research article DOI: 10.1371/journal.pne.0133409*

2015. *Naswa P, Traerup S, Bouroncle C, Medellín C, Imbach P, Louman B and Spensley J. Buenas prácticas para el diseño e implementación de sistemas nacionales de monitoreo para la adaptación al cambio climático. (Good practice in the design and implementation of national monitoring systems for climate change adaptation). Climate Technology Centre and Network, Denmark, 80 pp.* *http://www.ctc-n.org/*

Monitoring and impact of the assistance:

☒By signing this request, I affirm that processes are in place in the country to monitor and evaluate the assistance provided by the CTCN. I understand that these processes will be explicitly identified in the Response Plan in collaboration with the CTC, and that they will be used in the country to monitor the implementation of the CTCN assistance.

☒I understand that, after the completion of the requested assistance, I shall support CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term impacts in the country.

Signature:

NDE name:	*Ministry of Housing, Land Planning and Environment*
Date:	*24 / NOV / 2015*
Signature:	*Ignacio Lorenzo* *NDE Deputy*

THE COMPLETED FORM SHALL BE SENT TO THE CTCN@UNEP.ORG

Need help? The CTCN team is available to answer questions and guide you through the process of submitting a request. The CTCN team welcomes suggestions to improve this form.

>>> Contact the CTCN team at ctcn@unep.org