RIVIERADE

Kick-off meeting

Trieste 16-18 Feb 2026

Vision, Objectives, and Expected Impact

Stefano Salon, OGS

This project has received funding from Horizon Europe RIA under Grant Number 101181983

Two years ago… (almost)

European Commission <EC-NO-REPLY-GRANT-MANAGEMENT@nomail.ec.europa.eu> gio 22 feb 2024, 12:43

a Stefano

Europa / Funding & Tenders Portal notification

Dear Proposal Participant,

The following proposal has been submitted to the Funding & Tenders Portal Submission System:

Submitted by	: Caterina FANARA (cfanara@inogs.it)
Proposal acronym	: RIVIERADE
Proposal ID	: 101181983 (internal reference number: SEP-211013293)
Call	: HORIZON-CL6-2024-CLIMATE-01
Type of action	: HORIZON-RIA
Topic	: HORIZON-CL6-2024-CLIMATE-01-6
Call closure	: 2024-02-22 17:00:00
Date of submission	: 2024-02-22 12:42:50

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European Commission <EC-NO-REPLY-GRANT-MANAGEMENT@nomail.ec.europa.eu> gio 22 feb 2024, 12:43

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Submitted by	: Caterin
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Type of action	: HORIZ
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Call closure	: 2024-02-22 17:00:00
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State-of-the-Art & Current Gaps

- **Resolution & Physical Dynamics**: Current global climate projections (IPCC, C3S) lack the high spatial resolution required to resolve mesoscale structures and regional ocean dynamics essential for coastal decision-making.
- **Missing Biogeochemical (BGC) Data**: Regional BGC indicators (e.g., pH, nutrients, plankton) are largely absent from long-term projections, hindering robust assessments of future ocean health and ecosystem status.
- **Uncertainty Quantification**: Existing regional assessments often rely on disparate datasets produced without common protocols, limiting the ability to provide a coordinated quantification of uncertainty.
- **The Decadal Gap**: A significant methodological gap exists between operational daily ocean forecasting (CMEMS) and long-term climate projections, particularly in exploiting the predictability of internal climate variability.
- **Coastal Risk Limitations**: Current flood and erosion analyses typically focus on global or continental scales, lacking the integrated forcing factors and high-resolution data needed for effective regional basin planning.

RIVIERADE Specific Objectives

Table 1.1. *RIVIERADE specific objectives.*

SO#	Specific Objective [means of verification] and WPs
SO1	Improve ocean and regional climate modelling capabilities to produce climate change impact assessment in European seas (BAL, BLK, MED) and their coastal area by: i) sharing, integrating and merging existing capabilities to improve the representation of ocean and marine ecosystem processes and dynamic into climate models, and ii) developing a common framework and protocol for multi-model multi-sea evaluation to assess the representativeness of the model ensemble against available observations and to quantify its uncertainties [number of coupled atmosphere-ocean-biogeochemical modelling systems used in the ensemble; number of coupled model simulation runs; reports on protocols and on model evaluation; and open peer-review publications] (WP3, WP4, WP5)
SO2	Delivering a coherent ocean dataset of a first-of-its-kind coordinated ensemble of high-resolution, multi-model, multi-sea, decadal to multi-decadal climate simulations for quality assessed indicators on ocean status and health at basin scale for the three *target seas*, including uncertainty quantification [reports on protocols, on model development, production of ESGF-ready datasets (raw data)] (WP3, WP4, WP5)
SO3	Delivering coherent ocean data sets of dynamically downscaled very-high-resolution, multi-model, multi-sea, climate simulations for indicators on extreme sea level and coastal risk along all coasts and of relevant physical and biogeochemical indicators at selected *coastal regions* [Adriatic Sea, Swedish Coast, Marmara Sea, Southern Black Sea] at the decadal to multi-decadal temporal scale. [scientific publications; FAIR data and information (key variables and indicators), open documents (e.g. protocols, reports on Zenodo, peer-review publications) and codes (models, codes, tools on GitHub repository)] (WP6)
SO4	Delivery of regional ocean climate impact/risk services and of regional ocean climate services supporting blue economy (aquaculture, fishery, tourism) in 4 *local selected coastal sites* to be chosen and co-designed with end-users and stakeholders board. [use cases documentation, fact sheets] (WP1, WP2, WP5, WP6)
SO5	Delivery of a RIVIERADE catalogue produced in compliance with Open Science recommendation and FAIR principles, including key variables data sets, indicators, documents and codes, to support future studies and further climate services, and in order to favour the integration of project products and results into the digital perspective and the Digital Twin Ocean activities [digital catalogue] (WP2, WP3, WP4, WP5, WP6)

RIVIERADE Specific Objectives

Improving modelling capabilities: high-res, BGC, ecosystem + common framework

Grand ensemble + UNC at the *basin scale*

High-res indicators on ETWL and coastal risk at the *coastal scale*

Climate services for blue economy in *4 sites*

FAIR catalogue of key variables, indicators, docs and codes

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RIVIERADE Ambition & Innovation

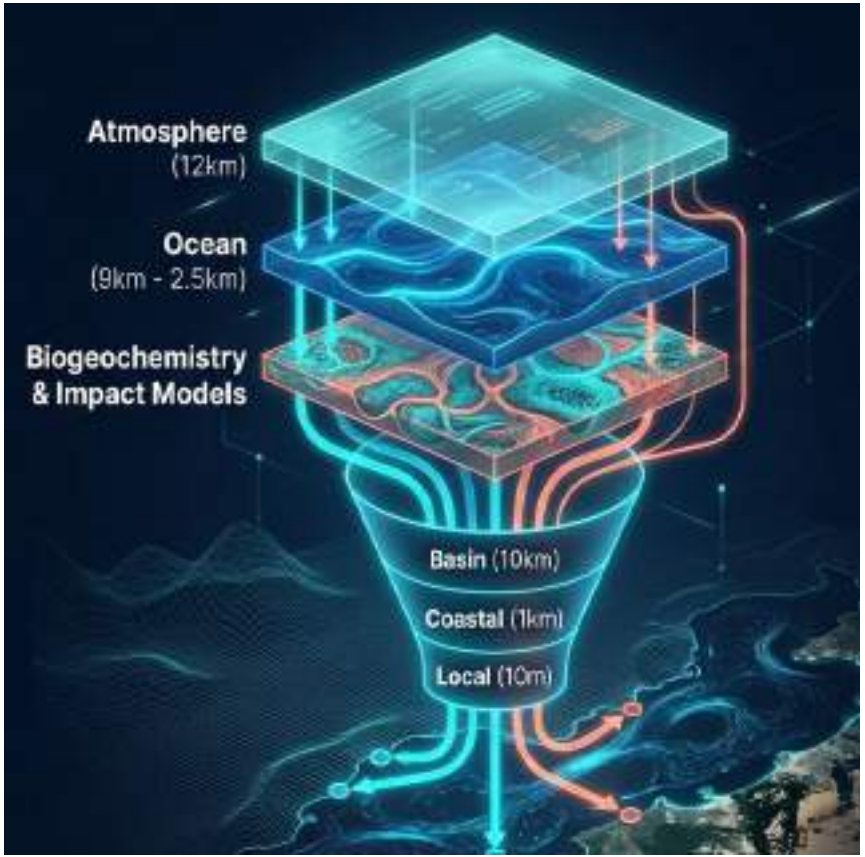
• **First-of-its-Kind coordinated, multi-model, multi-sea Grand Ensemble**: ~60 high-resolution simulations to quantify projection uncertainty across BAL, BLK, MED

• **Seamless Decadal Predictions**: adapting DCPP protocols and using realistic initialization, to bridge the gap between sub-seasonal forecasts and multi-decadal projections.

• **Integrated Regional Modeling**: regional ESMs integrating atmosphere, ocean, biogeochemistry at unprecedented resolutions.

• **High-Resolution Impact Tools**: innovative, fast, process-based models resolving coastal flood and erosion risks at the local scale for the first time.

• **Validated Climate Services**: a sustainable, circular framework for co-designing climate services with stakeholders, ensuring all scientific outputs meet "on-the-ground" user requirements.



RIVIERADE VISION

- Bridging the gap between the CORDEX (climate) and Copernicus Marine Service (operational) communities.
- Delivering validated climate services for European Seas on a decadal to multi-decadal horizon.
- Developing a pre-operational, replicable multi-model framework for climate change impact assessment.

RIVIERADE VISION… in practice for SCIENCE?

- Model protocols and products provided by RIVIERADE are adopted by CORDEX, C3S, and CMEMS.
- RIVIERADE climate services in the frame of GCOS ECVs and CMEMS OMIs are fully operationalised. Coastal risk services are operationalised at the European basins and at all the vulnerable coastal areas.
- The RIVIERADE modelling framework is replicable and applied to all European seas, including coastal areas, with regular update of decadal and multi-decadal simulations for the European seas to improve results and reduce uncertainty.
- Ocean climate scientists, Coastal scientists and engineers, Environmental scientists, Policy researchers will benefit from the RIVIERADE results and build new research and products on them.

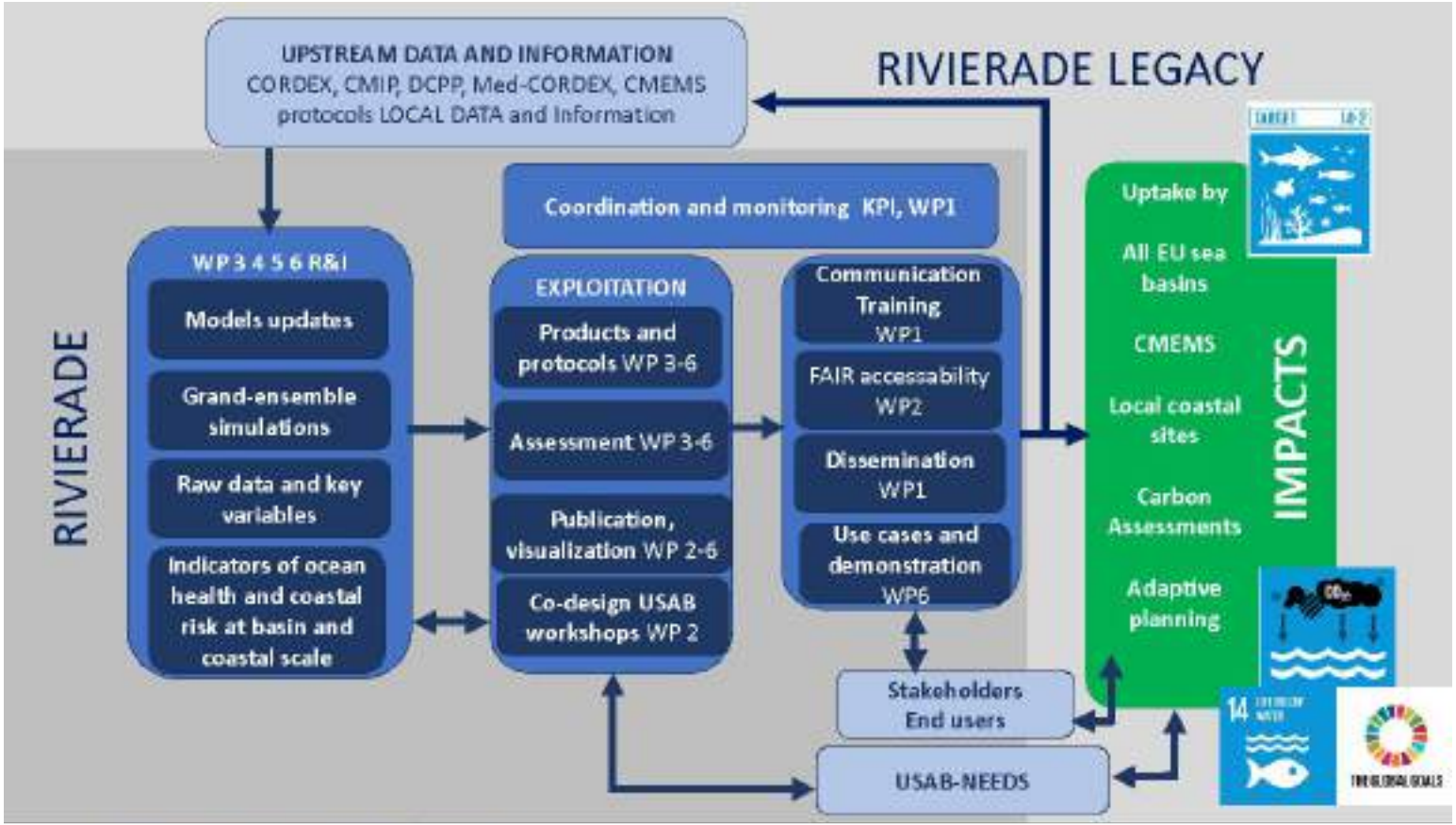
RIVIERADE VISION… in practice for SOCIETY?

- Engaged stakeholders and new stakeholders will use RIVIERADE data, information and knowledge to improve societal resilience to climate change.
- Educational Institutions will use RIVIERADE data, information and knowledge to enrich educational curricula, and train future generations.
- NGOs and Civil Society Organizations will use the project's findings to advocate for policy changes, raise awareness and support resilient responses.
- Policymakers (UN-IOC, UN-FCCC, UN-EP, EU DG MARE, EU DG CNECT), Environmental protection agencies (EEA, EU regional seas conventions, national, local) and Civil Protection will use the findings to inform decision-making.

RIVIERADE VISION… in practice for ECONOMY?

- Tourism, Fisheries and Aquaculture Sectors, Maritime Transport, Port Authorities will develop strategies to adapt to changing maritime conditions, enhance port resilience, and ensure the safety and efficiency of maritime transport operations.
- Understanding uncertainty will support economic choices.

RIVIERADE PATHWAYS TOWARDS IMPACTS



RIVIERADE IMPACTS

Science: RIVIERADE is integrated into the Destination Earth programme, contributes to transition to carbon neutral Europe, and to fulfilment of strategic goals: restoring and increasing natural carbon sinks to reach climate targets and restore biodiversity, sustaining blue economy, and maintaining a healthy ocean (MSFD, the EU Zero pollution action plan, EU Biodiversity Strategy).

Society: Increased public awareness contributing toward UN SDG 13 *Climate Action*, Target 13.3 *Build knowledge and capacity to meet climate change*. RIVIERADE framework and results are used to implement nature-based solutions, in line with SDG Goal 14 Life below water (Targets: 14.1, 14.2. 14.3. 14.5) and supporting the fulfilment of the 30% biodiversity protection by 2030. Uncertainty is analysed and used to make decisions.

Economy: Use of RIVIERADE catalogue allow to mitigate shocks and climate stress, improve decision-making, optimise resources management, reduce the potential negative impacts of climate change (flooding and coastal erosion) on blue economy sectors ensuring their long-term viability and sustainability, and develop new solutions to address emerging challenges in marine and coastal environments. Uncertainty is analysed and used to make decisions.

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MEASURING IMPACTS (KPI monitoring)

Table 2.1. KPIs of RIVIERADE towards delivering the expected outcomes and impacts (SOs: Specific Objectives).

	KPI description	Measures	SOs	WP
1	Number of improved modelling platform configurations for multi-decadal projections of the basin-scale European seas	7	1	4,5
2	Total number of multi-decadal scenario simulations for the basin-scale target seas physics, biogeochemistry, ETWL	>25	2,3	4,5
3	Number of running downscaled climate prediction prototype systems for each basin-scale target sea	1	2,3	3
4	Number of multi-partner publications assessing the impact of climate change on the physics, biogeochemistry, ETWL and/or coastal risks	>10	1,2,3, 4,5	2,3,4, 5,6
5	Number of CMOR-standardised basin-scale model output datasets ready for publication on the ESGF at the end of the project	>30	2,5	4,5
6	Number of indicators relevant for ocean health and blue economy, produced at the basin scale and at the coastal scale for each sea basin	>10	3,5	6
7	Number of indicators for coastal risks produced at the basin scale and at the coastal scale for each sea basin	>2	3,5	6
8	Number of use cases for coastal risks and blue economy	4	3,4,5	6
9	Stakeholders: scoping workshops for the three target seas	3	4	2
10	USAB minimum number of participants	5	4	2

MEASURING IMPACTS

- **Initial TRL** = 3 (“scripts and functions exist to solve the problem”)
- **Final TRL** = between 5 (“Alpha version of the software functionalities tested by outsiders of the development team”) and 6 (“Beta version of the software functionalities tested by selected end-user under a control mode”)
- **Initial SRL** = between 2 (“formulation of problem, proposed solution and potential impact, expected societal readiness, identifying relevant stakeholders for the project”) and 3 (“initial testing of proposed solution together with relevant stakeholders’’)
- **Final SRL** = between 4 (“problem validated through pilot testing in relevant environment to substantiate proposed impact and societal readiness”) and 6 (“solution demonstrated in relevant environment and in co-operation with relevant stakeholders to gain initial feedback on potential impact”)

MAXIMIZING IMPACTS (see also CDE talk)

CLUSTER WITH THE 3 PROJECTS FUNDED BY THE SAME TOPIC
Horizon-CL6-2024-CLIMATE-01-6
Ocean models for seasonal to decadal regional climate impacts and feedbacks:

- SEACLIM - European SEAs CLIMate impact prediction through regional models (Leader Mercator Ocean, FR)
- EU-INTERCHANGE - European Regional and Coastal Seas in a Rapid Changing Climate (Leader Technische Universiteit Delf, NL)
- MOIRAI - Multiscale Ocean models and Information for climate Risk Assessment and Impact mitigation (Leader National Technical University of Athens, GR)

⇒ discuss synergistic activities, joint communication/dissemination activities:

joint session on "DO34B: Regionally Downscaled Ocean Climate Predictions and Projections" at the upcoming OSM2026 in Glasgow

EuroGEO Marine & Coastal Action Group Survey

MAXIMIZING IMPACTS (see also CDE talk)

LINKS WITH R&I ACTIVITIES & PROJECTS (just some examples…)

Bridging Scientific Communities

Climate Science (CORDEX)
Multi-decadal projections

Operational Oceanography (CMEMS)
Operational rigor & high resolution

RIVIERADE: A Unified European Modelling Capability

Breaking silos to create seamless, valid, and actionable ocean climate services

Fueling the European Digital & Green Transition

Measuring Success: Key Performance Indicators

7

Improved Modelling Platform Configurations.

>25

Multi-decadal Scenario Simulations (Physics & BGC).

>10

Multi-partner Publications on Climate Impact.

>30

CMOR-standardized Datasets (ESGF Ready).

>12

New Indicators for Ocean Health & Coastal Risk.

Establishing joint protocols for future replication.

Questions?

RIVIERADE

Partners