

**Interreg**



Co-funded by  
the European Union

**Italy – Croatia**

---

 **AcquaGuard**



# INTERREG ITALY-CROATIA PROGRAMME 2021 – 2027

## RHEA-DAPT: AI-RAG Decision Support System for Transformative Climate Change Adaptation Planning

January 2026

# RHEA-DAPT: from data to decision

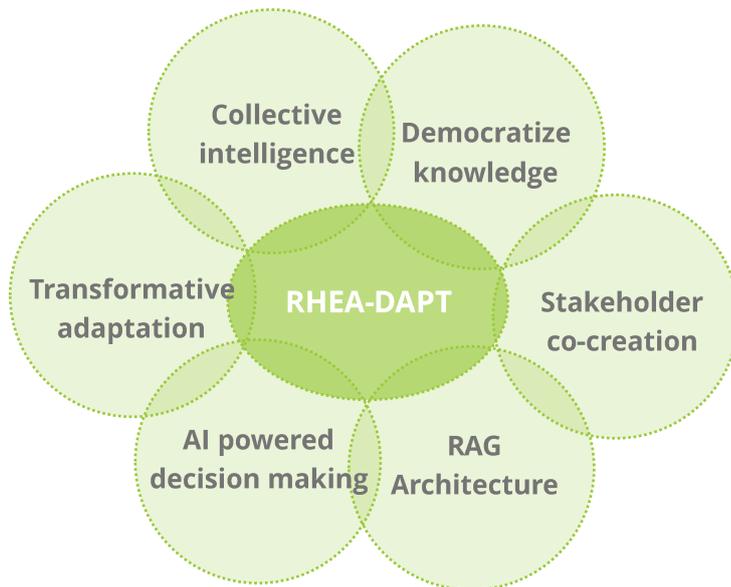
How can we expand and share climate knowledge more effectively?

How can we innovate current analytical and decision-making tools to support the development of transformative adaptation pathways?

Climate change adaptation requires innovative tools to support informed decision-making  
 Knowledge democratization: a new era demands a new paradigm

## RHEA-DAPT: DEMOCRATIZE CLIMATE INTELLIGENCE

The aim is to bridge the gap between climate intelligence and actionable adaptation strategies, despite significant advances in climate science and Artificial Intelligence, a critical gap persists in translating data into context-specific operational adaptation pathways.



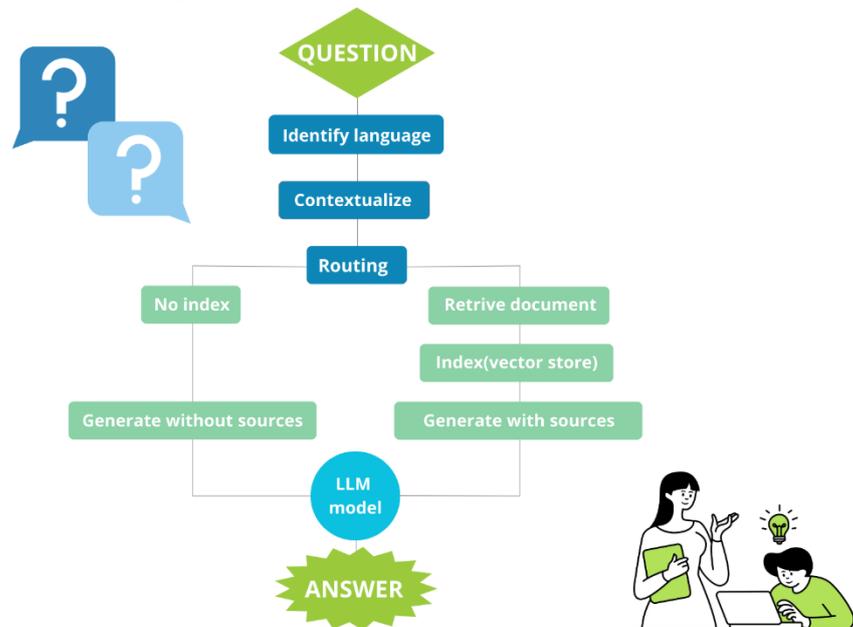
**AI-RAG** (Artificial Intelligence - Retrieval-Augmented Generation) Decision Support System democratizes access to climate information and supports local transformative adaptation pathways. It is a digital tool that combines Artificial Intelligence with an advanced information retrieval system to support decision-makers in the field of climate and territorial governance. Unlike traditional AI systems, which generate responses based solely on statistical models, a Retrieval-Augmented Generation (RAG) system **actively consults databases, scientific documents, climate scenarios, regulations, and updated guidelines, integrating verifiable content into its responses.** In this way, the information provided is not generic but grounded in real sources and contextualized to the specific problem at hand.



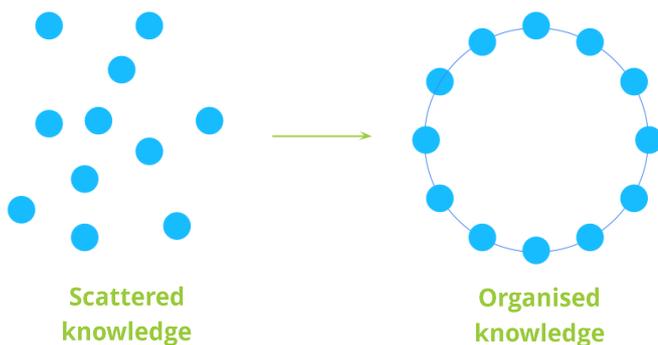
## WORKFLOW ARCHITECTURE

The **RAG system** is based primarily on two models: a “**retriever**” and a “**generator**”.

- The **retriever** is responsible for fetching relevant pieces of data from the knowledge base.
- The **generator** takes in the information accumulated by the retriever and tries to generate responses that are semantically correct.



## THE ROLE OF AUGMENTED COLLECTIVE INTELLIGENCE



**Collective Intelligence** can be understood as the enhanced capacity that is created when people work together, often with the help of technology, to mobilize a wider range of information, ideas and insights (UNDP, 2022). RHEA-DAPT thus transforms the selection of NbS into an act of augmented collective intelligence, **where technology does not replace the decision-maker**, but **amplifies their ability to navigate complexity and co-create transformative adaptation scenarios**.

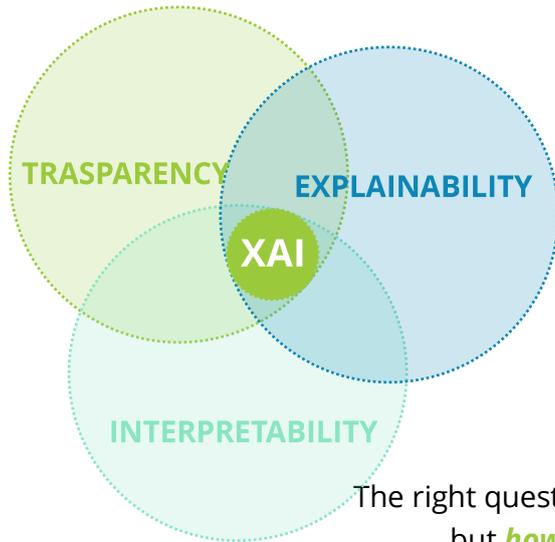
### BUT, HOW?

- ✓ Applying participatory approaches (such as **Prompt Battles** and AI Quizzes) to align AI capabilities with local climate adaptation needs.
- ✓ Implementing surveys and **iterative feedback cycles** during the development phase to validate and enhance the tool’s usability and relevance.
- ✓ Engaging stakeholders in continuous collaboration to refine functionalities and **expand the knowledge** base over time.



## XAI: CULTIVATING ETHICS, TRANSPARENCY, AND RISK AWARENESS

Traditional AI models often produce an output, but it's not clear how they arrived at it. **Explainable AI (XAI)** aims to providing insights into which data influenced the decision, how different variables were weighted, why one outcome was preferred over another, how confident the system is in its prediction... In practical terms, XAI helps users move from simply asking "What is the result?" to also understanding "Why did the system produce this result?"



AI can **help us ask better questions**, not just find faster answers.

AI is not *the* solution, but a **support for more mindful choices**.

AI as a **knowledge navigator**, not a decision-maker.

The right question isn't **whether AI is intelligent...** but **how we can use it intelligently**

## RHEA-DAPT USER EXPERIENCE

To operationalize this knowledge, **RHEA-DAPT** will be available, an interactive platform built on Streamlit, an open-source Python framework that enables rapid development of interactive web applications (<https://streamlit.io/>). The interface allowing users to interact with the model in **Italian, Croatian, and English**.

The screenshot shows the RHEA-DAPT web interface. At the top left, it features the Interreg logo, the European Union flag, and the text 'Co-funded by the European Union'. Below this, it says 'Italy – Croatia' and the AcquaGuard logo. On the right side, there is a 'Deploy' button with a dropdown arrow. The main content area has the title 'RHEA-DAPT' and the subtitle 'Talking about climate adaptation'. Below the subtitle is a chat icon and the text 'How can I help you?'. On the left side, there is a 'Suggested Questions' section with three buttons: 'What are Nature-based Solutions (NbS)?', 'How adaptation pathways is defined by IPCC?', and 'Can you give me some information on the AcquaGuard project?'. At the bottom left, it says 'Lead Developer' and the CMCC logo. At the bottom right, there is a search bar with the text 'Hi!' and a dropdown arrow.



Can you give me an overview of main flood-related policies and their connection with NBS in Veneto Region and Karlovac County?



In Veneto Region and Karlovac County, there are several flood-related policies that incorporate Nature-Based Solutions (NBS) to manage flood risks. For instance, the Italian government's National Flood Risk Management Plan includes NBS measures aimed at enhancing resilience and ecosystem health in flood-prone areas. These solutions can help reduce flood damage by slowing down water flow, restoring habitats, and increasing biodiversity.

In Karlovac County, the local authorities have implemented a range of NBS strategies to mitigate flood risks, including green infrastructure like wetlands, parks, and green roofs, as well as early warning systems and flood-proof construction techniques. These efforts aim to protect life, property, and critical infrastructure from flooding.

The Croatian government's National Climate Adaptation Strategies also emphasize the importance of incorporating NBS into flood risk management plans. By doing so, they can enhance resilience in flood-prone areas while promoting sustainable practices and preserving natural resources.

These policies demonstrate how NBS are being recognized as crucial tools for effective flood management in Veneto Region and Karlovac County, showcasing their potential to improve lives and protect the environment.

Sources:

- File: I3\_D.1.2.1 Portfolio NBS\_CORILA\_V1.0.pdf - (Page: 5, Page: 16);
- File: I1\_D1.1.2. RiskPortfoliofor the project regions..CMCC\_V1.0.pdf - (Page: 13);



Reci mi nešto o strategiji prilagodbe klimatskim promjenama u Hrvatskoj, navedi 5 ključnih točaka i objasni glavne ciljeve



Strategija prilagodbe klimatskim promjenama u Hrvatskoj je ključna za očuvanje ekološke svjesti i osiguranje budućnosti našeg društva.

5 ključnih točaka o strategiji prilagodbe klimatskim promjenama u Hrvatskoj:

1. **Prioriteti:** Sastavljena je skupina prioriteta za osiguranje ekonomskog, ekološkog i društvenog razvoja i očuvanja ekosistemskog zdravlja.
2. **Mjerne ulaze:** Određene su mjerne ulaze za uvršćenje u praktično rješenje problema klimatskih promjena, kao što je osiguranje energetskih izvora i smanjenje emisije stakleničkih plinova.
3. **Sustavno razvojni proces:** Sustavna razvojna strategija će omotriti eksploataciju prirodnih sresursa, osigurati trajnostveni razvoj i zanemariti nepredvidljive konsekvence klimatske promjene.
4. **Nacionalni plan za prilagodbu:** Nacionalni plan za prilagodbu klimatskim promjenama će omotriti praksu polakočenja i uvesti procesnju komunikaciju o potrebnoj transformaciji sustava.
5. **Internaciona saradnja:** Količće će smanjiti trošak za održivi razvoj kroz preuzimanje ukusa u razvojskom procesu, smanjenjem ulaganja u ne potrebne tehnologije i integracijom internacionalih standarda.

Sources:

- File: \data\DB\02\_HR\_doc\AdaptationStrategy\_HR.pdf — (Page: 3, Page: 10, Page: 13, Page: 14, Page: 10);
- File: \data\DB\02\_HR\_doc\AdaptationMitigationCCProgramme\_KAZUP.pdf — (Page: 1, Page: 155, Page: 156);



Descrivi 5 possibili Nbs per la laguna di Venezia e cosa indica il PTRC



La laguna di Venezia è un'area conosciuta per le sue criticità idrauliche. Ecco 5 possibili Nature-Based Solutions (Nbs) che potrebbero essere utilizzate per migliorare la qualità dell'acqua e ridurre i rischi idrografici.

1. Reti di scolaria artificiali: queste reti possono aiutare a ridurre l'introduzione di nutrienti nella laguna, migliorando la qualità del fiume.
2. Collettori biologici: questi dispositivi utilizzano le piante per catturare i nutrienti e gli inquinanti dall'acqua, sostituendo quelli tradizionali che possono causare problemi.
3. Reti di trasferimento idrico naturale (IRN): queste reti consentono all'acqua dell'acqua del fiume di fluire verso il mare in modo più sostenibile.
4. Piantumazioni di biomassa: queste piantumazioni possono essere utilizzate per assorbire anidride carbonica dall'atmosfera e ridurre la quantità di carbonio inquinante nell'acqua.
5. Piani di difesa idrologica integrati (PDCI): questi piani possono aiutare a prevenire le inondazioni e i problemi idraulici nella laguna, migliorando la qualità dell'acqua e riducendo il rischio di collasso della barriera.

Queste sono solo alcune possibili Nbs che potrebbero essere utilizzate per la laguna di Venezia. La scelta del progetto è legata alle esigenze specifiche della zona, quindi bisognerà considerare fattori come la disponibilità delle risorse, l'impatto ambientale e le possibilità di implementazione.

Sources:

- File: I3\_PTRC 2020\_tavolo\_15\_07\_2021.pdf - (Page: 29)
- File: 26\_PTRC 2020\_tavolo\_15\_07\_2021.pdf - (Page: 26)
- File: 9.PIANOACQUE\_Tav.01.03.00.Schede\_criticita.pdf - (Page: 39);

## KEY OUTCOMES & VALUE PROPOSITION

- **Knowledge Democratization** simplifies complex climate data into actionable insights for local authorities, **bridging the technical gap** between scientific research and territorial policy.
- **Precision-Driven DSS (AI-RAG)** drastically **mitigates the risk of AI hallucinations** by grounding every response in a verified database of spatial plans, regional policies, and technical reports.
- **Mainstreaming Nature-based Solutions (Nbs)** accelerates **the identification and prioritization of Nbs** tailored to the specific vulnerabilities of the Italy-Croatia cross-border regions.
- **Operational Sustainability** enhances decision-making efficiency with **a low-carbon architecture** that navigates systemic complexity while reinforcing, rather than replacing, human judgment.

