

# Civil Protection exercise for river and coastal risk organized and realised

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## Introduction

Among the non-structural prevention activities carried out by Civil Protection is the promotion and organization of exercises to increase risk awareness and prepare the Civil Protection system and the population for emergency management (in Italy, this provision is outlined in Legislative Decree no. 1/2018 "Civil Protection Code").

While there have been previous hydraulic risks exercises in Italy, the first coastal exercise in Emilia-Romagna took place in September 2019 as part of the European project I-STORMS. This project, funded by the Interreg Adrion program, focused on the coastal areas of the Adriatic Sea. The drill simulated a flood event affecting coastal areas in the municipality of Cesenatico (FC). Based on the outcomes and lessons learned from this exercise, within the STREAM project a similar initiative was repeated in another area of the Emilia-Romagna coast, with some modifications to the simulation.

The exercise, organized by Arpae and its associated partners, the Emilia-Romagna Region and the Emilia-Romagna Civil Protection Agency, represented the final phase of training and information activities carried out in the pilot area of the municipality of Comacchio (FE). Its aim was to improve knowledge of marine and coastal events and test the early warning procedures for hydraulic and coastal alerts. The exercise was aimed at high school students, school staff, municipal administration, volunteers, and civil protection officers, and contributed to the STREAM project's objective of raising awareness of flood events and prompt reaction to floods among people living along the Italian and Croatian coasts.

## CHAPTER 1: Objectives and contents of exercise

The exercise took place on April 1, 2023, and was organized in the territory of the municipality of Comacchio (FE), the pilot area of the STREAM project on the Emilia-Romagna coast. It was part of the activities of WP5 of the project. Its objective was to improve the response capacity of the regional civil protection system and manage the risks of local flooding, as well as enhance emergency services on the Adriatic coast. In particular, the objectives were as follows:

- Verify the current criticalities on the coast, taking into account the ongoing and completed civil protection interventions (presence of works on the coast).
- Test the regional warning system for meteorological, hydrogeological, hydraulic, and coastal risks, with particular attention to the actions to be taken (intervention model) following the issuing of alerts for hydraulic and coastal criticalities, and sea state (in the forecast phase), as well as notifications of exceeding of hydrometric thresholds during an event.
- Define and test the coastal risk management procedures for the updating of the civil protection planning at different levels in accordance with the new DPCM (Decree of the President of the Council of Ministers) of April 30, 2021, "Guidelines for the preparation of civil protection plans at different territorial levels."
- Test the flow of information between coastal territorial offices and their respective municipalities, beach cooperatives, or other stakeholders.
- Test the new information regarding observing stations and marine-coastal forecasting products included in the AllertameteoER Portal.
- Identify the most effective methods of providing timely and accurate information to the public and professional associations.
- Carry out training activities for students at a school hosting the Municipal First Response Center.
- Verify the local strategic resources needed to deal with emergencies (emergency areas and facilities).

- Observe and gather information during the exercise phases to improve the warning system.

The entities and structures involved were:

- Arpae Emilia-Romagna, Hydro-Meteo-Climate (Arpae-SIMC)
- Emilia-Romagna Region - Agency for Territorial Security and Civil Protection:
  - Technical Coordination Sector for Territorial Security and Civil Protection
  - Territorial Security and Civil Protection Sector - Reno District - Ferrara Territorial Office
  - Emilia-Romagna Region - Territory Defense Sector - Geology, Soils, and Seismic Area
- Municipality of Comacchio
- Coordination of Civil Protection Volunteer Associations Ferrara
- "Remo Brindisi" Higher Education Institute

Several partners of the European STREAM project also participated in the exercise as observers.

### Simulated Meteo-Marine event

For the exercise, the reference was made to the exceptional atmospheric event that occurred in the early days of December 2020, when the Emilia-Romagna region was hit by heavy rain, high temperatures, and strong winds. These conditions led to high tides along the entire coastal area and, after the snow had completely melted, to landslides and flooding throughout the entire regional territory.

The entire regional Civil Protection system was activated, involving local, regional, and national components within various coordination centers and damage scenarios. The regional control room, functional center, and hydraulic authorities operated continuously 24/7. At the provincial level, the Rescue Coordination Centers (CCS) and Integrated Operational Rooms (SOUI) were activated in

collaboration with the Prefects, and the Municipal Operational Centers (COC) were opened by the municipalities.

The coast, affected by high tides, suffered significant damage, including the complete destruction of the sea defense embankments in Lidi Nord, from Lido di Volano to Lido di Spina (coastal areas of the municipality of Comacchio where the exercise took place), and the complete removal of the winter dune that protected the beach resorts. In some areas, there were also cases of coastal inundation resulting in flooding.

Considering the characteristics of the events, the extension, and the severity of the effects, the President of the Emilia-Romagna Region requested the declaration of a state of emergency of national relevance for the exceptional atmospheric conditions, storms, snow, wind, high tides, landslides, and subsequent flooding that occurred in the Emilia-Romagna region starting from December 1, 2020.

For the selected event, from December 3 to 7, 2020, the regional warning system, consisting of the Functional Center of the Emilia-Romagna Region (managed by Arpae, a partner of the STREAM project) responsible for the forecasting and monitoring phase, along with the Emilia-Romagna Region and the Civil Protection Agency of Emilia-Romagna, issued five meteorological, hydrogeological, and hydraulic alerts.

This significant event along the coast of Emilia-Romagna served as a reference for the simulation of the event during the exercise, which involved two distinct phases corresponding to the alert phases: the forecast phase, with the issuance of the alert the day before, and the monitoring phase during the ongoing event and emergency management.

## CHAPTER 2: Description of alerting procedures tested in the exercise

The intervention model tested in the exercise is defined in the "Document for the organizational and functional management of the regional alert system for meteorological, hydrogeological, hydraulic, coastal, and avalanche risks for civil protection purposes," approved with Regional Decree No. 1761/2020, and further detailed in provincial and local emergency planning.

The exercise involved testing risk prevention and emergency management actions implemented by the operational structures of the regional civil protection system in relation to the Alert Level (color code) and the following distinct time phases:

- Forecast phase: Before the event occurs, which corresponds to the activation of prevention actions aimed at reducing/mitigating possible damage to the territory and preparing for the management of potential emergency situations, in accordance with civil protection planning and the content of the hydrogeological and hydraulic weather alert.
- Event phase: When the event occurs, which corresponds to the activation of monitoring, counteraction, and emergency management actions in response to the evolving situation that needs to be followed at the local level.

The communication of the expected Alert Level and the sending of notifications during the event had the main purpose of enabling entities and operational structures of the territorial civil protection system to prepare specific activities aimed at managing the expected phenomena and planning progressively implemented actions, from the "forecast phase" to the management of the "ongoing event," aimed at addressing critical situations that may arise in the territory.

The activities were partially carried out virtually and partially in actual implementation. (See detailed table below)

The coordination bodies to be activated during the exercise at various levels of government are:

- Functional Center Arpae- SIMC
- Regional Agency for Territorial Security and Civil Protection - Regional Operational Center



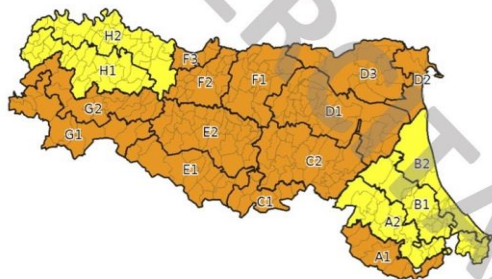
- Regional Agency for Territorial Security and Civil Protection - Territorial Security and Civil Protection Sector, Reno District - Territorial Office of Ferrara
- Coordination of Voluntary Civil Protection Associations Ferrara (CAVPCFE)
- Municipal Operations Center (COC) coordinated by the Mayor (functions: technical, volunteering, resources and materials, telecommunications) of the Municipality of Comacchio.

### Forecast Phase (March 31, 2023)

On March 31, 2023 (the day before the exercise), at 12:11, the Arpae Functional Center and the Civil Protection Agency of Emilia-Romagna issued a forecast for various phenomena and potential hazards expected for April 1st and sent it to the Municipality of Comacchio and the entities involved in the simulation (below is the alert for the exercise).

*The regional website for alerting is: <https://allertameteo.regione.emilia-romagna.it>*

DOCUMENTO N.	DATA EMISSIONE	INIZIO VALIDITA'	FINE VALIDITA'
ESE/031/2023	31/03/2023 12:05	01/04/2023 00:00	02/04/2023 00:00



**ZONE DI ALLERTA:**

- A1: Montagna romagnola (FC, RN)
- A2: Alta collina romagnola (RA, FC, RN)
- B1: Bassa collina e pianura romagnola (RA, FC, RN)
- B2: Costa romagnola (RA, FC, RN)
- C1: Montagna bolognese (BO)
- C2: Collina bolognese (BO, RA)
- D1: Pianura bolognese (BO, FE, RA)
- D2: Costa ferrarese (FE)
- D3: Pianura ferrarese (FE)
- E1: Montagna emiliana centrale (PR, RE, MO)
- E2: Collina emiliana centrale (PR, RE, MO)
- F1: Pianura modenese (RE, MO)
- F2: Pianura reggiana (RE)
- F3: Pianura reggiana di Po (PR, RE)
- G1: Montagna piacentino-parmense (PC, PR)
- G2: Alta collina piacentino-parmense (PC, PR)
- H1: Bassa collina piacentino-parmense (PC, PR)
- H2: Pianura piacentino-parmense (PC, PR)

	CRITICITA' IDRAULICA	CRITICITA' IDROGEOLOGICA	CRITICITA' PER TEMPORALI	VENTO	TEMPERATURE ESTREME	NEVE	PIOGGIA CHE GELA	STATO DEL MARE	CRITICITA' COSTIERA
A1	GIALLO	GIALLO	VERDE	ARANCIONE	VERDE	VERDE	VERDE		
A2	GIALLO	GIALLO	VERDE	GIALLO	VERDE	VERDE	VERDE		
B1	GIALLO	GIALLO	VERDE	VERDE	VERDE	VERDE	VERDE		
B2	GIALLO	GIALLO	VERDE	VERDE	VERDE	VERDE	VERDE	GIALLO	GIALLO
C1	ARANCIONE	ARANCIONE	ARANCIONE	ARANCIONE	VERDE	VERDE	VERDE		
C2	ARANCIONE	ARANCIONE	ARANCIONE	GIALLO	VERDE	VERDE	VERDE		
D1	ARANCIONE	VERDE	VERDE	GIALLO	VERDE	VERDE	VERDE		
D2	ARANCIONE	VERDE	VERDE	ARANCIONE	VERDE	VERDE	VERDE	ARANCIONE	ARANCIONE
D3	ARANCIONE	VERDE	VERDE	GIALLO	VERDE	VERDE	VERDE		
E1	ARANCIONE	ARANCIONE	ARANCIONE	ARANCIONE	VERDE	VERDE	VERDE		
E2	ARANCIONE	ARANCIONE	ARANCIONE	GIALLO	VERDE	VERDE	VERDE		
F1	ARANCIONE	VERDE	VERDE	VERDE	VERDE	VERDE	VERDE		
F2	ARANCIONE	VERDE	VERDE	VERDE	VERDE	VERDE	VERDE		
F3	ARANCIONE	VERDE	VERDE	VERDE	VERDE	VERDE	VERDE		
G1	ARANCIONE	ARANCIONE	GIALLO	ARANCIONE	VERDE	VERDE	VERDE		
G2	ARANCIONE	ARANCIONE	GIALLO	GIALLO	VERDE	VERDE	VERDE		
H1	GIALLO	GIALLO	VERDE	VERDE	VERDE	VERDE	VERDE		
H2	GIALLO	GIALLO	VERDE	VERDE	VERDE	VERDE	VERDE		

Flow of activities during the forecast phase

H. 12:10	Municipality of Comacchio	Receives the ORANGE alert.	REAL
		Receives the notification via SMS and email regarding the alert.	REAL
		Pre-alerts the members of the COC to assess the possible opening of the Coordination Center.	REAL
		The civil protection officer gathers information about the forecasted phenomena from the Alert website <a href="https://allertameteo.regione.emilia-romagna.it">https://allertameteo.regione.emilia-romagna.it</a> .	REAL
		Maintains telephone contact with the representatives of the Ferrara Territorial Office.	REAL
		Pre-alerts the local Civil Protection Volunteers (ODV) in order to verify their operational readiness.	REAL
		Communicates the alert to the operators of the ferry service in Porto Garibaldi for the purpose of evaluating a possible closure with barriers at the access points.	VIRTUAL
		Informs the population about the ongoing alert and the self-protection measures for the predicted phenomena by publishing them on the municipality's Facebook page and website.	VIRTUAL
		Contacts the associations affiliated with the bathing establishment operators, as well as the operators of public establishments and commercial activities along the Porto Garibaldi canal, to communicate the alert.	VIRTUAL
		Based on the expected event, verifies any critical issues (including temporary ones and ongoing construction sites) in the municipal territory, also through monitoring if necessary, and communicates them to the Territorial Office of Ferrara.	REAL
		Contacts the CADF (Civil Protection Operational Center) and the Consorzio di Bonifica Pianura di Ferrara (Consortium for Land Reclamation of the Ferrara Plain) to verify any critical issues in the territory.	VIRTUAL
H. 12:10	CavpcFE	Receives the general activation.	REAL
		Alerts the volunteer operators and verifies the readiness of vehicles and equipment, providing this information to the representatives of the Territorial Office of Ferrara.	REAL
H. 12:10	ARSTPC - Volunteer Office	Opens the STARP event to register the volunteers assigned to their respective services.	REAL
	ARSTPC - Territorial Security and Civil Protection Department - Reno District - Ferrara UT	Following the event monitoring, contact the Responsible of CAVPCFE to verify the readiness of vehicles and equipment, organizing a telephone briefing in the early hours of the morning to take timely actions for preparation and emergency management if necessary.	REAL

## Event monitoring phase (April 1, 2023)

### Flow of activities during the event monitoring phase

Temporal sequence	Entities/Structures	Actions	Modes
H. 8:30	ARSTPC - Territorial Security and Civil Protection Sector - Reno District - Ferrara UT	Verifies with the COR the evolution of the ongoing event based on the updated forecast models analyzed by ARPAE-SIMC-CF.	REAL
		Based on the findings, contacts the Consortium for Land Reclamation and the CADF to analyze the criticalities on the territory in light of the updated forecast analyses.	VIRTUAL
		To ensure the effectiveness of emergency management activities, coordination is established with CAVPCFE, mobilizing teams, equipment, and vehicles (hydraulic kit modules) to be deployed for monitoring along critical points.	REAL
H. 8:40	CavpcFe	The emergency coordinator of CAVPCFE informs the Territorial Office of Ferrara about the departure of teams from CUP to Comacchio and Codigoro.	REAL
H. 9:00-12:00	ARSTPC - Territorial Security and Civil Protection Sector - Reno District - UT Ferrara	Activates the flood service and territorial surveillance by opening the offices and deploying personnel for monitoring critical areas at risk of flooding along the coast and the embankments of the Navigable Canal, as well as for technical assessments and any necessary safety measures.	REAL
		Verifies the forecasted tidal levels and the progression of the ongoing event (wave at the Cesenatico buoy - data from the tide gauge at Porto Garibaldi - hydrometers in the hydraulic network along the Po - Navigable off Volano, as well as pluviometers), consulting the dedicated tools.	REAL
		In accordance with the Municipality of Comacchio, coordinates the monitoring of critical sections within its jurisdiction and the control of the closure of floodgates with the involvement of volunteer teams from CAVPCFE, who provide support to UT Ferrara. During the exercise, approximately 20-30 volunteers are expected to participate in site inspections of the most critical areas. Additionally, arranges for the placement of sandbags in areas at higher risk of coastal inundation if necessary.	REAL
		In accordance with the Mayor of the Municipality of Comacchio and the Prefecture UTG of Ferrara (the latter virtually), and with the support of CAVPCFE, sets up a pre-emptive reception center at the IIS "Remo Brindisi" in Lido degli Estensi, as planned by the municipality. This includes providing meal preparation services for the hosted population (see image below).	REAL
		Communicates to ARSTPC - COR the mobilization of volunteers and proceeds to upload the data to STARP in the designated area created with the opening of the Event.	REAL
		Maintains contact with the Consortium for Land Reclamation of Ferrara and Burana for updates on the levels of the owned hydrometers.	VIRTUAL
		Constantly monitors the data related to the rain gauges upstream and within the Po di Volano basin.	REAL
		Verifies the inflow rates into the basin with the Consortiums for Land Reclamation (Pianura and Burana).	VIRTUAL
		Sends its own technician to the COC	REAL
		Arranges for the possible opening of the gates on the Po di Volano-Navigabile to lower the hydraulic levels in accordance with the inflows into the river basin.	VIRTUAL

		Arranges for the possible raising of the mobile defenses in the town of Codigoro (+ 1.50 meters above sea level) with the support of CAVPCFE, which will provide subsequent monitoring.	VIRTUAL
		Verifies with colleagues the possible presence of construction sites along the coast and in the relevant hydraulic section.	REAL
		Maintains contact with the coastal municipalities for reporting any critical issues in the area.	REAL
		Provides support to local authorities and the Prefecture.	VIRTUAL
		Keeps the COR updated by promptly reporting any critical issues and completes the "Emergenza_FE" file in the shared Orma folder and the WebSOR application.	REAL
		Participates in the CCS	VIRTUAL
H. 9:00-12:00	Municipality of Comacchio	Following the evolution of the event, it implements the operational procedures of the municipal emergency plan in a state of Alert (Red Alert Code).	VIRTUAL
		Activates the Support Functions of the Municipal Operations Center, expanding its scope to include the participation of the SSTPC-UT FE	REAL
		Activates the territorial surveillance of the Technical Office, PM, and the local Civil Protection volunteers. Sends teams composed of municipal technicians and local volunteers to carry out specific interventions on critical situations and predetermined points as outlined in the civil protection plan, in close coordination with the Ferrara UT.	REAL
		The Mayor issues an order to close the Volano pier, the quays (right and left) of the port canal, the beach areas from Lido Volano to Lido Nazioni, and the beach of Spina from Bagno le Piramidi to the municipal border.	VIRTUAL
		Constant coordination is maintained with the Territorial Office of Ferrara.	REAL
		The volunteers of the local Civil Protection Volunteer Organization (OdV) are sent to the commercial activities along the Porto Canale to provide assistance by placing sandbags and monitoring critical points along the coast.	REAL
		Keeps the population informed about the alert and self-protection measures for the current events by publishing updates on the municipality's Facebook page and website.	VIRTUAL
		Keeps the Agency informed through the official from the Ferrara UT present in the COC.	REAL
H. 12:30	ARSTPC - Territorial Security and Civil Protection Sector - Reno District - UT Ferrara	Updates ARSTPC - COR on the ongoing emergency situation.	REAL
		Send the information regarding the reported damages and the activities carried out by the Ambito and the Voluntary sector to ARSTPC - COR.	REAL



## Exercise location

The aerial photograph of the exercise location is shown. The proximity of the school to the Porto Canale in the Lido degli Estensi area (Comacchio - FE) can be observed.

Denominazione	Tipo Area	Localizzazione	ID_AE
Campo sportivo Lido degli Estensi	Area Campale Area di accoglienza scoperta	Via A. Manzoni, Lido degli Estensi	AE004



## CHAPTER 3: Description of activities carried out and photographic documentation

The activities of April 1<sup>st</sup> were carried out according to the program outlined below. The activities involved volunteers, partners, civil protection operators, and students from ISS Remo Brindisi.

<b>DATE</b>	1st April 2023	
<b>TIME</b>	08.30 – 15.00	
<b>LOCATION</b>	Municipality of Comacchio	
<b>PROGRAM</b>		
<b>TIME</b>	<b>ACTIVITIES</b>	<b>LOCATION</b>
08:30 – 08:45	Participants' welcome	IIS Remo Brindisi
08:45 – 09:30	Presentation of the STREAM project activities for hydraulic and coastal alerting and description of the exercise	IIS Remo Brindisi
09:30 – 12:00 <i>School</i>	Mobile kitchen activity: preparation of the weekly menu and meal preparation for the day	IIS Remo Brindisi
09:30 – 12:00 <i>Partners and operators</i>	Activity of positioning sandbags at the Porto Canale (Lido Estensi side) carried out by the volunteers of CavpcFe  Visit at critical points in the area	Porto Canale (Porto Garibaldi), Lido Volano, and Lido Nazioni/Pomposa (ongoing construction site)
12:00 – 13:00	Launch	IIS Remo Brindisi
13:00 – 15:00	Final briefing and summary of the day	IIS Remo Brindisi

During the morning, in the main hall of the Remo Brindisi Institute, the STREAM project team presented the activities carried out in the project related to hydraulic and coastal alerting, as well as the coastal exercise to be conducted later in the day in the pilot area of Comacchio.

The event was attended by students from the Remo Brindisi Institute who had been involved in the training activities, specifically the role-playing game, in the preceding days. Also present were volunteers from local civil protection associations, operators from Arpae (Regional Agency for Environmental Protection), and operators from the regional civil protection agency.



This brief introductory session was also attended by the school principal, Pierlia Stimolo, who emphasized the importance of these training activities on risk awareness for students, particularly in the context of increasing frequency and intensity of events due to climate change. Additionally, the councilor Antonio Cardì from the Municipality of Comacchio expressed appreciation and gratitude on behalf of the municipality for the engaging involvement of the STREAM project and spoke about the forthcoming presentation of the municipal civil protection plan to the community.





Following the project team's presentation, which aimed to reinforce knowledge of civil protection procedures and early warning systems among the audience, a quick feedback was requested from the students of the institute who had undergone training activities in the previous days.



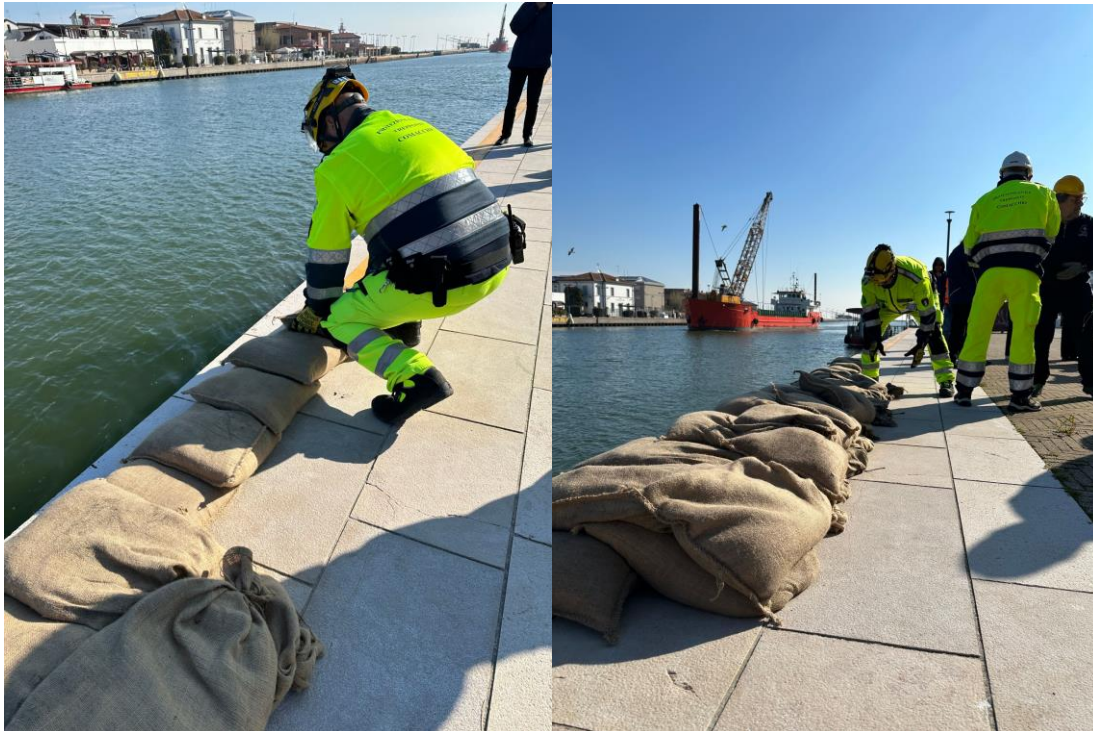
The exercise officially began around 10:30 with a sandbagging activity carried out by civil protection volunteers from local associations. A group of approximately 25 volunteers worked along the Porto Garibaldi canal. Students and technicians had the opportunity to experience firsthand one of the

most important activities to be carried out in the area in the event of a coastal inundation. The entire process was documented, including the use of drones to capture aerial footage of the affected area.

The documentary video of the exercise is available at this link:  
<https://www.youtube.com/watch?v=hfESa5T5Ebw>.





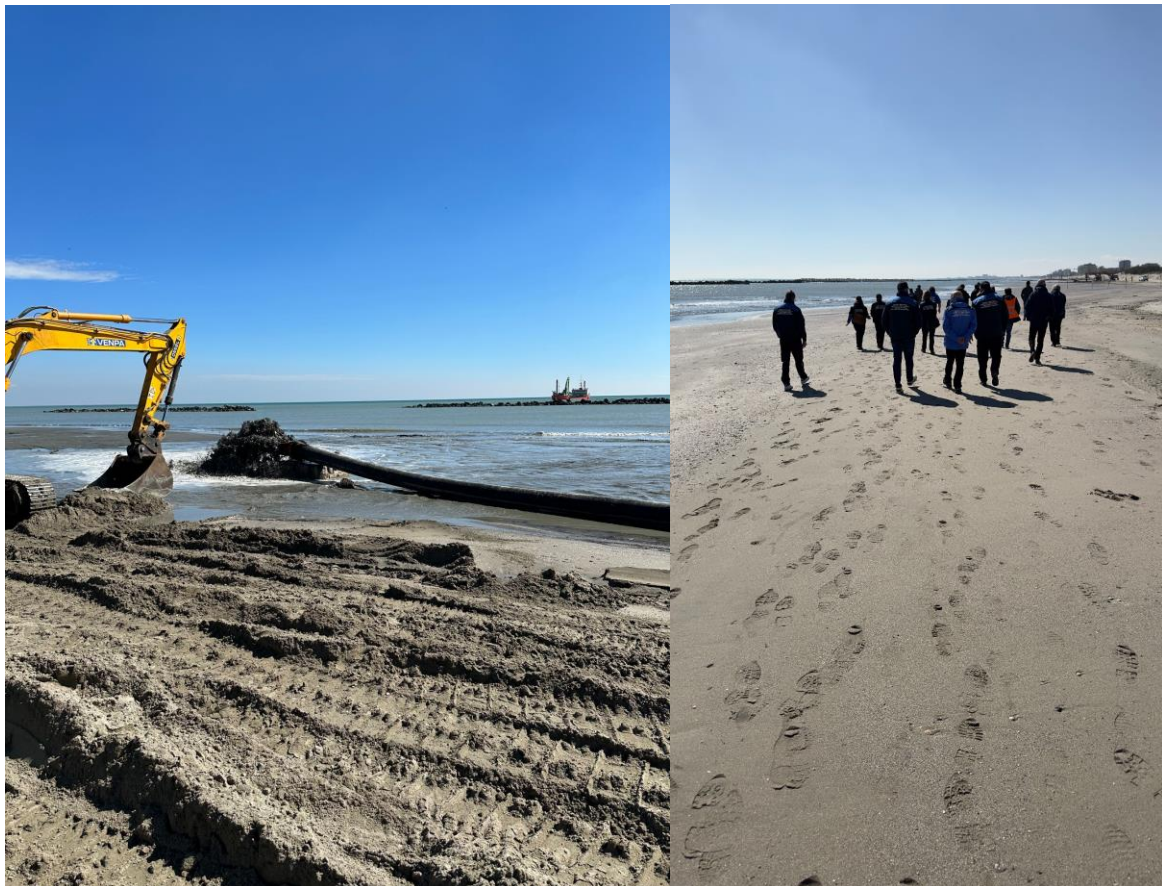


In the morning, a visit was conducted at critical points in the area. Two areas were visited: the first was Lido di Volano, where a breach occurred in the seaward defense embankment called Madonnina during an event in November 2022. The breach had a width of 35 to 40 meters and it was located to protect the pine forest and the inhabited area.





The second area visited was Lido delle Nazioni, specifically the area adjacent to Tahiti Beach, where the strong waves caused by the November 2022 event had eroded a significant portion of the beach. A dredger was working on beach nourishment in this area, as part of an ongoing project along the coastline between Lido Volano and Lido delle Nazioni, with the support of the Emilia-Romagna Region.



After the visit, the participants returned to the Remo Brindisi Institute, which served as the base for the exercise. Here, all the personnel involved had a meal prepared earlier in the morning in the field kitchens set up for the occasion. Students from two classes in the "Hotel and Catering" program, supervised by their teachers, collaborated with volunteers from the Coordinamento Associazioni Volontariato di Protezione Civile Ferrara to learn how to manage an "emergency" kitchen. In the event of a flood, citizens may be evacuated from their homes and taken to a reception center where they need to be provided with sleeping cots and a kitchen for meal preparation, taking into account different dietary requirements. The exercise activity for the students consisted of simulating this type of "kitchen" scenario, which is different from their usual restaurant services in the tourism sector.







The day concluded with a debriefing on the exercise, where the challenges in emergency management were highlighted, as well as the strengths of the exercise. Best practices in flood risk management were shared among the participants. At the end of the debriefing, project gadgets souvenirs were distributed to all participants.







## CHAPTER 4: Target, numbers and achieved results

Over 40 volunteers affiliated with the Provincial Volunteer Coordination of Ferrara (CavpcFe) were involved in the execution of the exercise. Considering the planned scenarios, the volunteers were mainly engaged in the following activities:

- Monitoring of banks and coastal areas
- Production and placement of sandbags for embankment reinforcement and protection of buildings
- Assistance and information to the population
- Setting up the first reception center at IIS "Remo Brindisi"
- Meal production using mobile and fixed kitchens at IIS "Remo Brindisi"

CavpcFe provided vehicles and equipment related to hydraulic risks:

- Vehicles equipped with hydraulic kits (pump and specific tools)
- CavpcFe vehicles
- Heavy machinery for transporting bulky materials and sandbags
- Mobile kitchen
- Materials and equipment for setting up the first reception center

In addition to providing service during the exercise, the volunteers had the opportunity to learn about the STREAM project, experience the management of an emergency related to a coastal event, and work closely with the students.

The students from the two classes of ISS Remo Brindisi, specializing in hotel and restaurant management (26 students, as per attendance sheet), had the opportunity to learn about the STREAM project, the early warning system of the Emilia-Romagna Region, and the activities of the Comacchio municipal administration. They also had hands-on experience in meal preparation using a field kitchen module. The students, under the coordination of some volunteers, worked to produce over 100 complete meals.

## Conclusion

Prevention and preparedness activities mitigate the effects of disasters on lives, property and the environment. Well-trained teams are more effective in responding to disasters.

Preparation for risk due to sea storms and floods, referring to the early warning systems and the emergency management procedures, is fundamental to overcome extreme events that will increase more and more in the context of climate change.

Exercises focused on coastal risk should be part of the institutional civil protection procedures in Italy and in Croatia, since they really help to test in a practical way the alerting and emergency management system, highlighting criticalities and keeping people and institutional players trained and up to date. It is useful that all the phases (e.g. briefing and debriefing) should follow standards and protocols.

Timely warnings are only one element in an effective EWS. Coastal communities have to be prepared through appropriate education programmes, as we have done in the STREAM project. It is therefore important that coastal communities are equipped with appropriate emergency response plans. These should include evacuation routes, regular drills and exercises to ensure that the population is aware of the risks and acts appropriately in such an event.

The experience of the coastal exercise within the STREAM project, along with the training activities that allowed the preparation of the municipal administration, students, and civil protection operators, represented an excellent opportunity to test the regional alert system for flood and storm surge risks and involve a broader target audience directly affected by the risks in the pilot area. The format of the exercise could be replicated in the future in other coastal areas to capitalize on the project's results.