Progetto Danube Floodrisk

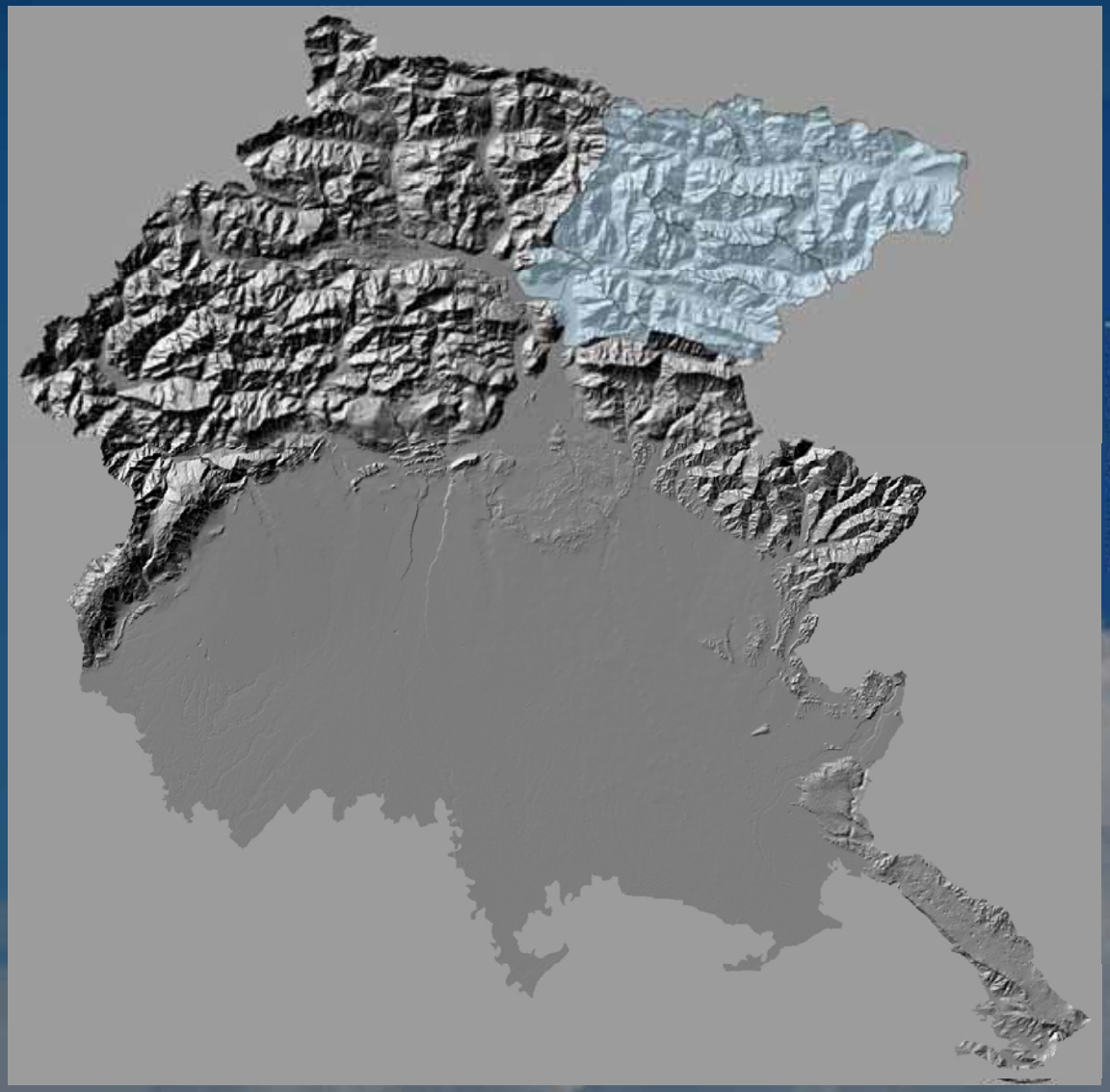
Civil protection in floodrisk planning and management : experiences in Friuli Venezia Giulia

Eng. Aldo Primiero, Civil protection office
of the Autonomous Region Friuli Venezia Giulia (IT)

Venezia, 13 settembre 2010

Friuli Venezia Giulia Region

Flood events in FVG from 1991 to 2009



2009

protection civile

- Municipalities damaged

24-26 November 2002 – Flood in Pordenone plain

Prata di Pordenone – loc. Prata di sopra

Pordenone

Pordenone- loc. Vallenoncello

Pasiano di Pordenone – loc. Traffe

596 mm / 72 hours

29 August 2003 – Flood in Val Canale - Canal del Ferro

Pontebba - Pietratagliata

Pietratagliata (Pontebba) – Confluence F.Fella-Rio Geloviz

293 mm / 4 hours

9 September 2005 – Downpour in lower Pordenone plain

Fiume Veneto - Azzano Decimo

173 mm / 6 hours

Ford of Vivaro to wade F.Meduna

22-25 December 2009 – Isonzo river high water event and flooding

Gradisca d'Isonzo – Sagrado

257 mm / 24 hours

654 mm in 4 days

Organization of the Civil protection of Friuli Venezia Giulia

Civil protection of FVG – National Department of Civil Protection

- **Regional Law No. 64/86**

PRESIDENT OF FVG REGION

COUNCILLOR FOR CIVIL PROTECTION

CIVIL PROTECTION OF FVG REGION

Area of General and Administrative Affairs

Technical and Scientific Area for the Forecasting-Prediction, Alerting and Coordination of Rescue

Regional Operative Room

Area of Prevention and Quick Intervention

zivilschutz

protection civile

Law 225/92

L .267/98

Functional Centres

Protocol May 2002

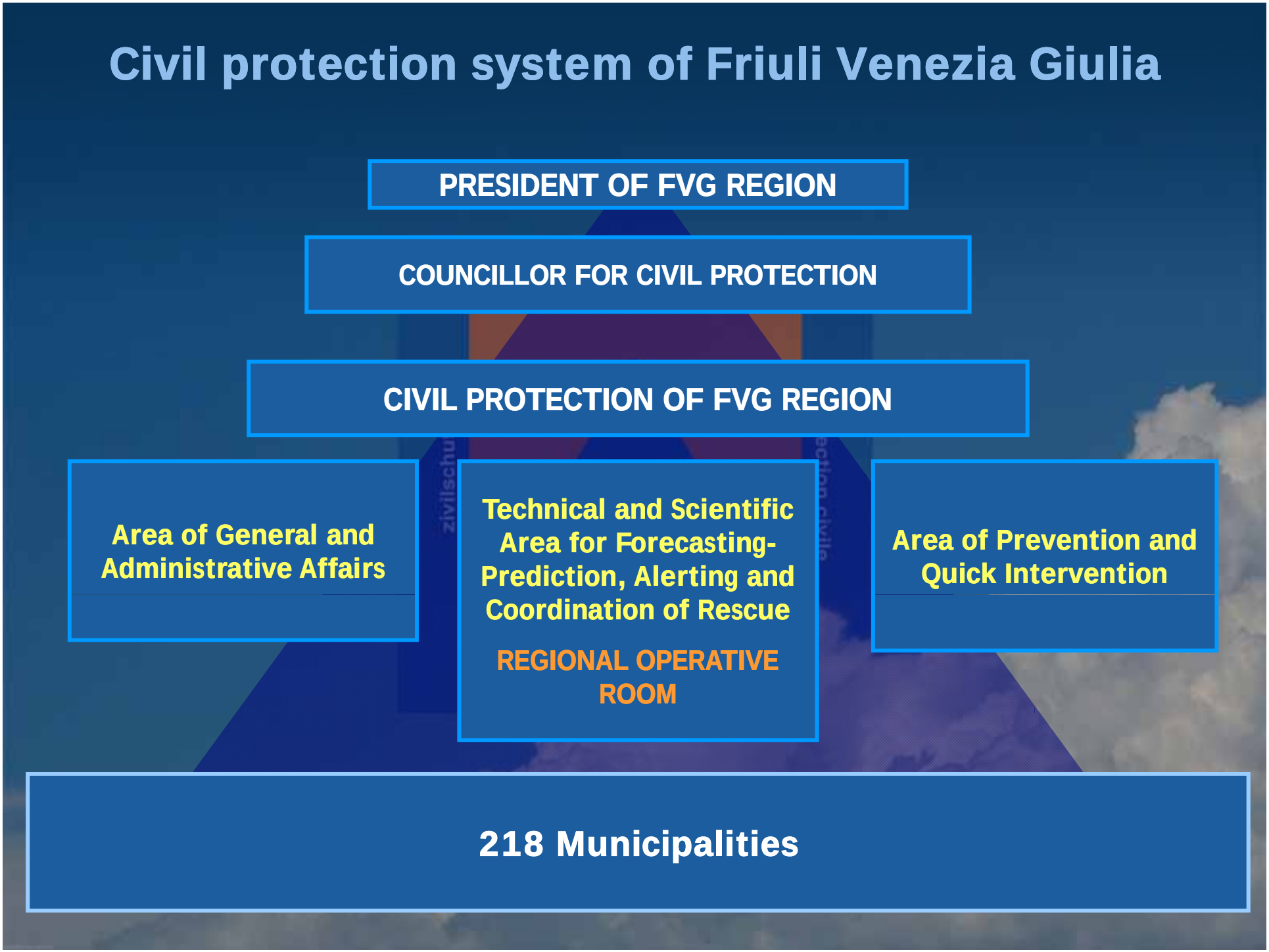
CCS Palmanova

PROTEZIONE CIVILE

NAZIONALE

- **Law 225/92**

Civil protection system of Friuli Venezia Giulia



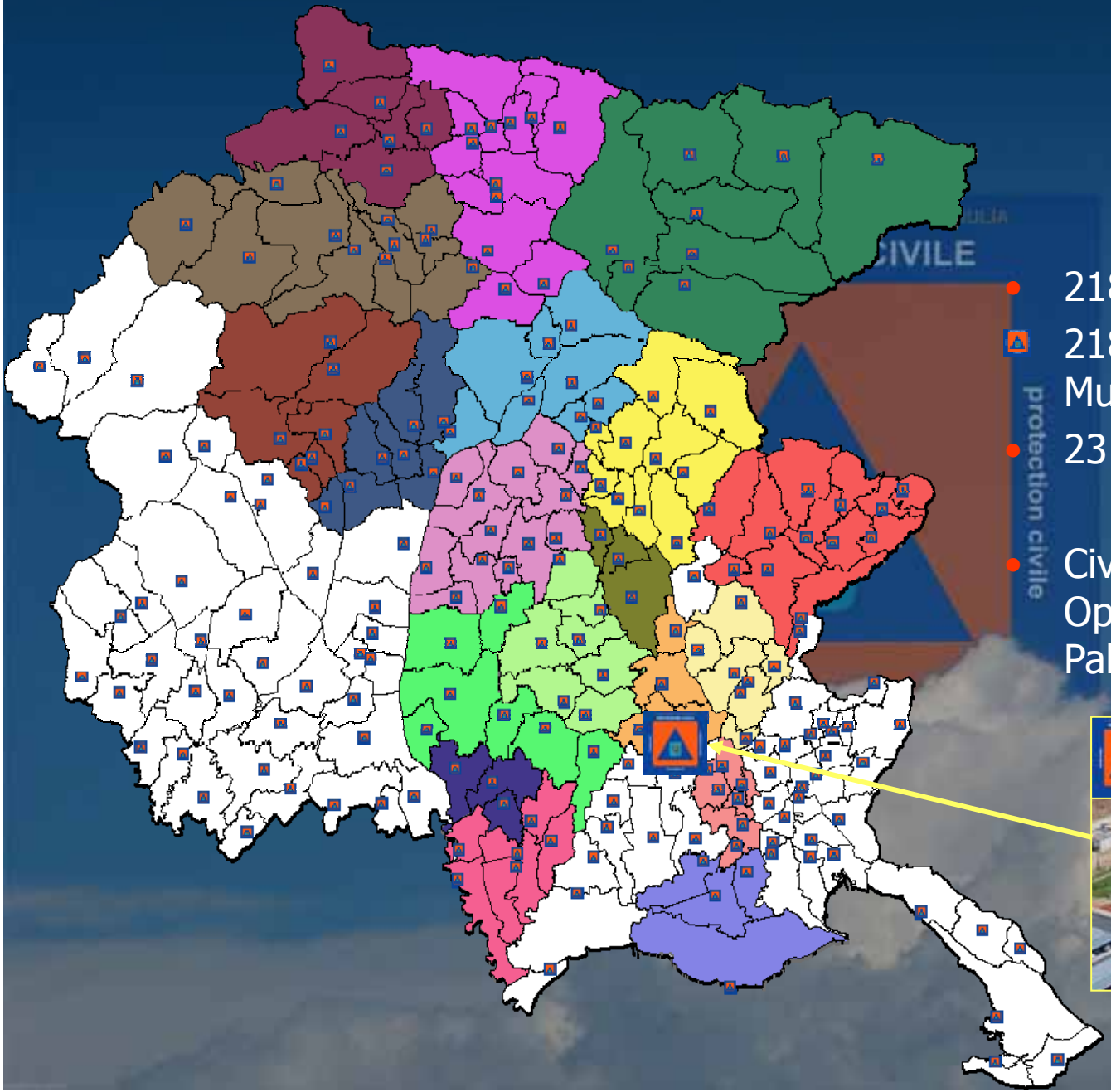
Municipality civil protection Groups

- The Major is the first Civil protection authority at local level, in FVG in every municipality he has at disposal an organised group of civil protection volunteers (men and women), trained and equipped with municipal and regional funds.

- The Major and all the volunteers know better than anybody else their own territory, and for this reason they are the main part within the Integrated Regional System of Civil Protection.

- Each Municipal Civil Protection Group has an Headquarter: a centre hub for every Civil Protection activity, both in the ordinary days and in the emergency periods .

Organisation widespread on the regional territory

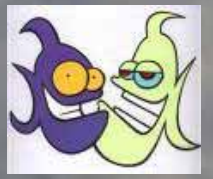


- 218 Municipalities
- 218 Civil protection Municipality Groups
- 23 Districts
- Civil protection Regional Operative Center in Palmanova: SOR/SOUP/CCS

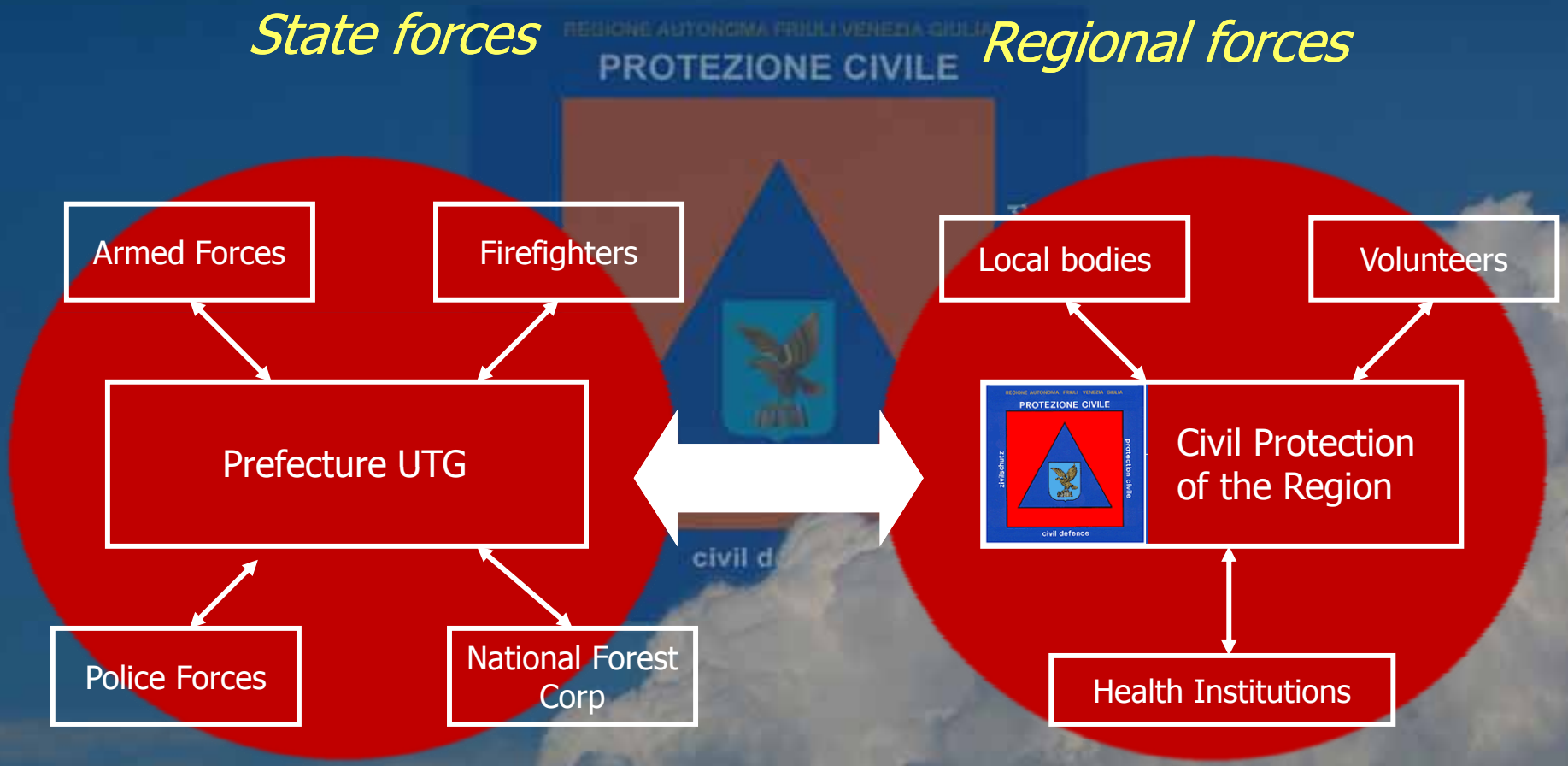
Volunteers

- Friuli Venezia Giulia Civil Protection Volunteers in the **Municipality Groups**:
  - 218 technical and logistical teams
  - 119 fire-fighting teams
  - 1 water rescue team
    - More than 8.000 volunteers
  - Equipments
    - More than 650 operative vehicles

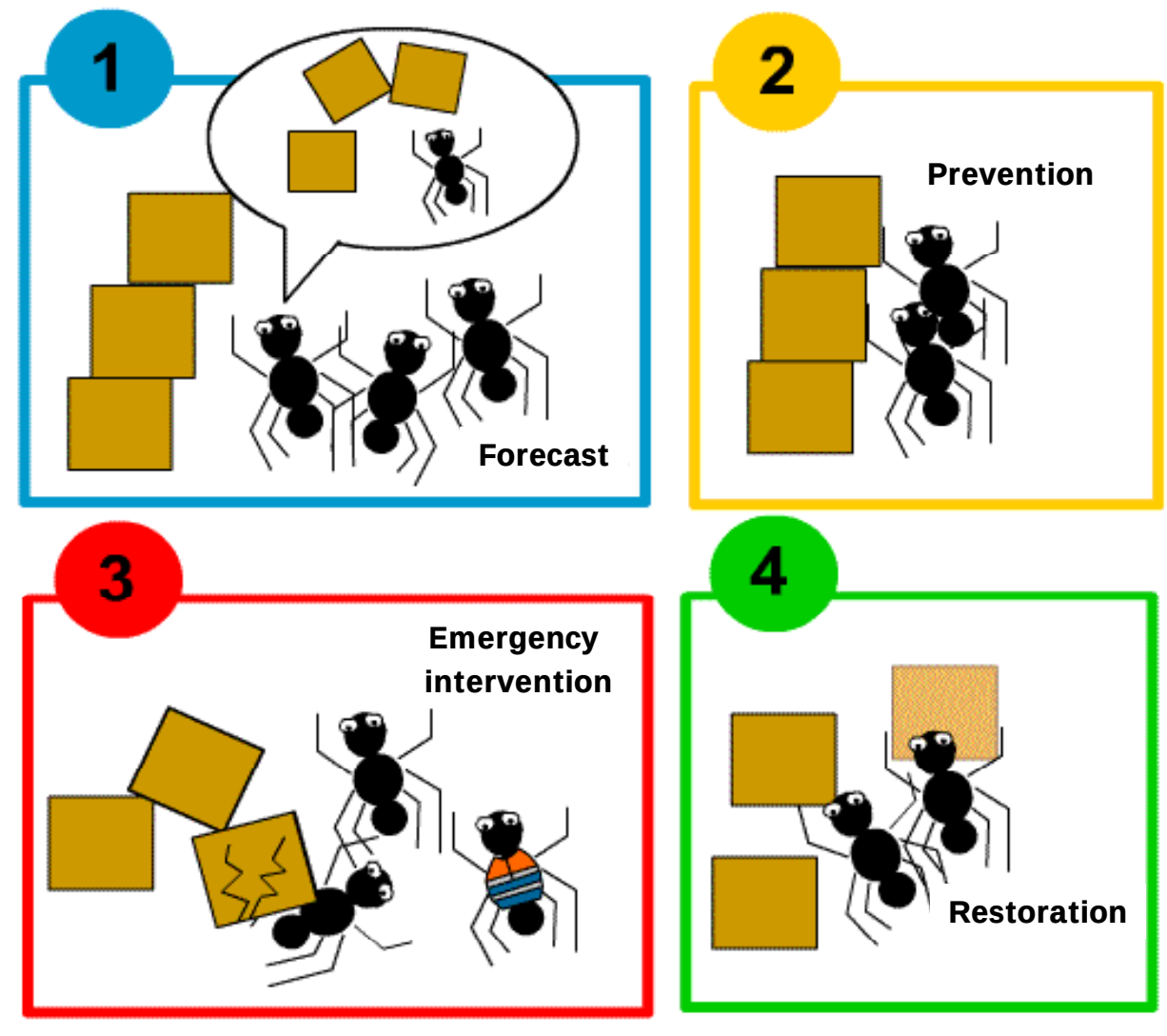
- Civil Protection **Associations**:
  - 80 associations
    - More than 3.600 volunteers



Integrated Regional System of Civil Protection of Friuli Venezia Giulia



The Four main activities of civil protection



PREVENTION actions

According to civil protection Regional Law n° 64/86 the regional civil protection system have as priority PREVENTION actions, defined on 3 levels:

- **Primary level**: actions addressed to lower, under a threshold considered "acceptable", the risk of happening of catastrophic situations or events ((studies, construction of defence facilities, emergency planing, training and improvement of civil protection system, …)
- **Secondary level**: actions for intervention at the first evidence of risk situations or catastrophic events, with the scope of limit the impact and dangerous effects (activities of surveillance and control on the territory , quick intervention works, evacuation an rescue, …)
- **Tertiary level**: actions for activating all measures needed to restore "normal" conditions of safe living (interventions to put in safety conditions the affected territory, restoration of viability and public services, rehabilitation and/or preparation of structures and facilities for public and private use and for productive activities, …)

Main tools for flood risk management and realisation of prevention actions

- *Regional Operative Room (SOR) in Palmanova*
- *Monitoring systems for real-time control of the territory*
- *Emergency planning for flood management*
- *Prevention, fast intervention and restoration works*
- *Preparedness: for civil protection personnel, volunteers and population*

Civil Protection Operative Centre

the Regional Operative Room in Palmanova (SOR)

- h24 control room
- Monitoring networks and logistic
- Coordinates the operations of civil protection
- Connected with DPC

Numero Verde Emergenze
800 500 300
Protezione Civile

Monitoring systems for real-time control of the territory

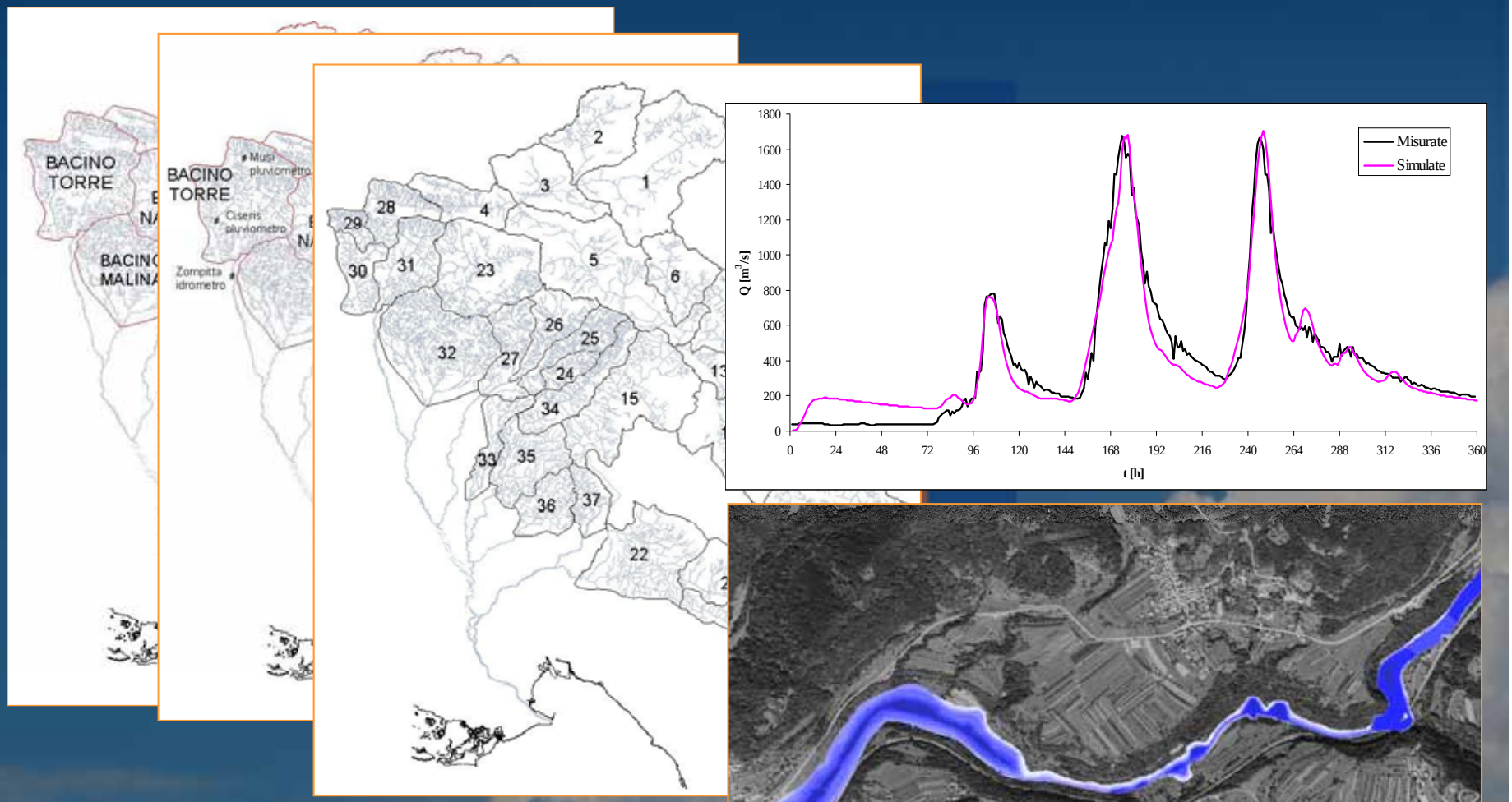
Data from **Monitoring Networks and other observing systems** are collected in the Regional Operative Centre in Palmanova :

- Hydro-Meteo-Marine monitoring network
- Hydro Geological monitoring network
- Meteorological Radars for nowcasting
- Satellite observations (Meteosat MSG)

Hydro Meteo Marine monitoring network

- For real time monitoring of ground effects of meteorological events an automatic monitoring network is managed by regional civil protection composed by:
  - 191 monitoring stations
  - 111 hydrometers
  - 112 rain gages
  - 27 barometers
  - 100 air thermometers
  - 5 sea level sensors
  - 18 snow level sensors
  - 4 present weather sensors

Data modelling: hydrological and hydraulic modelling of hydrographical basins



Precipitation study and flood prediction

Emergency planning for flood management

Regional civil protection emergency plan
and
Municipality civil protection emergency plans

Activities toward a new Regional Emergency Plan with coherent Municipality Emergency Plans

Re-analysis of natural and anthropic risks in over-municipality scale and preparation by Civil Protection of the Region (PCR) of
DETAILED REGIONAL RISK MAPS

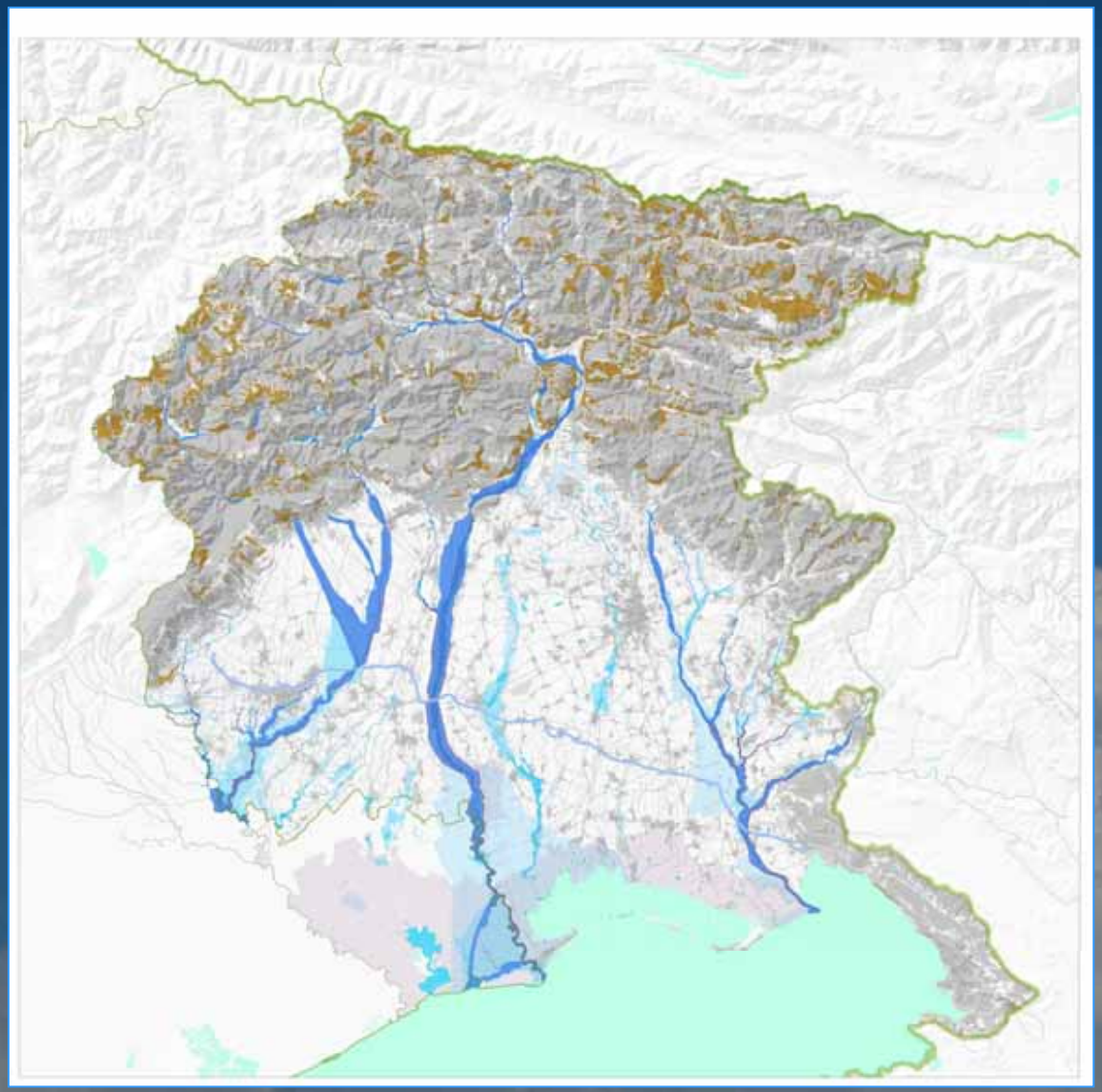
REGIONAL PLAN FOR CIVIL PROTECTION EMERGENCIES
Definition of general operative functions in relation to the roles of State, Region and Municipalities

SINGLE MUNICIPALITY EMERGENCY PLANS
Punctual definition of risks and intervention procedures at municipality level, realized in agreement between PCR and single Municipalities

Continuous updating of data on their own resources by the Municipalities using the WEB platform www.protezionecivile.fvg.it

REGIONAL EMERGENCY PLAN
IDENTIFICATION OF RISKS ON LARGE SCALE

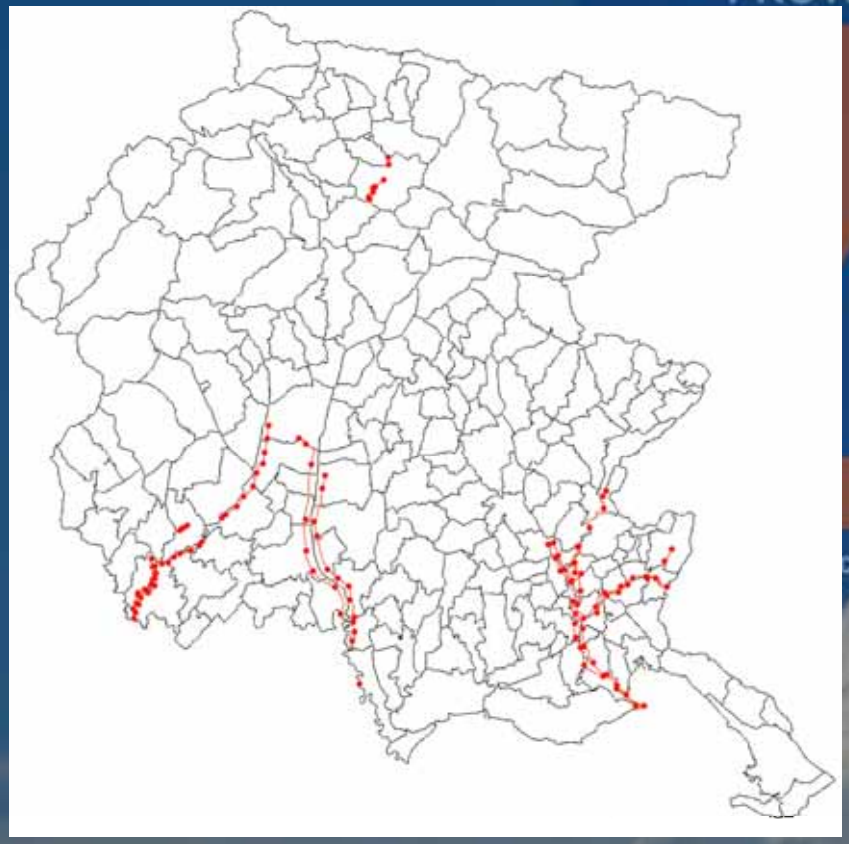
HYDRO-GEOLOGICAL RISK



REGIONAL EMERGENCY PLAN
RISK IDENTIFICATION -> OPERATIVE PROCEDURES

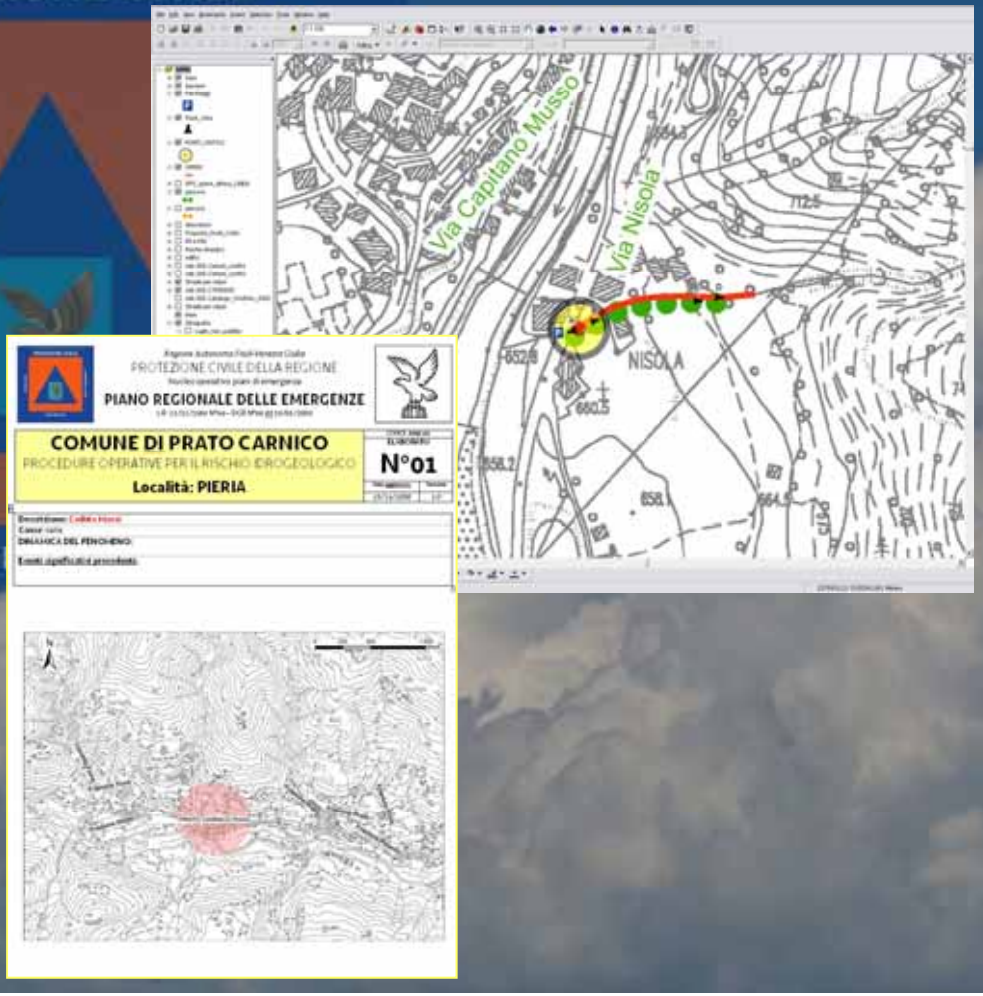
FLOOD RISK

REGIONAL PLAN FOR HIGH-WATER SERVICE



HYDROGEOLOGICAL RISK

REALISATION OF OPERATIVE PROCEDURES FOR HYDROGEOLOGICAL RISK



The High-water service

"High-water service" ("servizio di piena") consists of procedures and activities for the monitoring of river embankment status, in the case of water level exceeding fixed warning levels. Are established 4 phases:

I) Preliminary planning phase → task of Civil protection of the Region (PCR) and Provincial Directions of Public Works (DPLLPP)

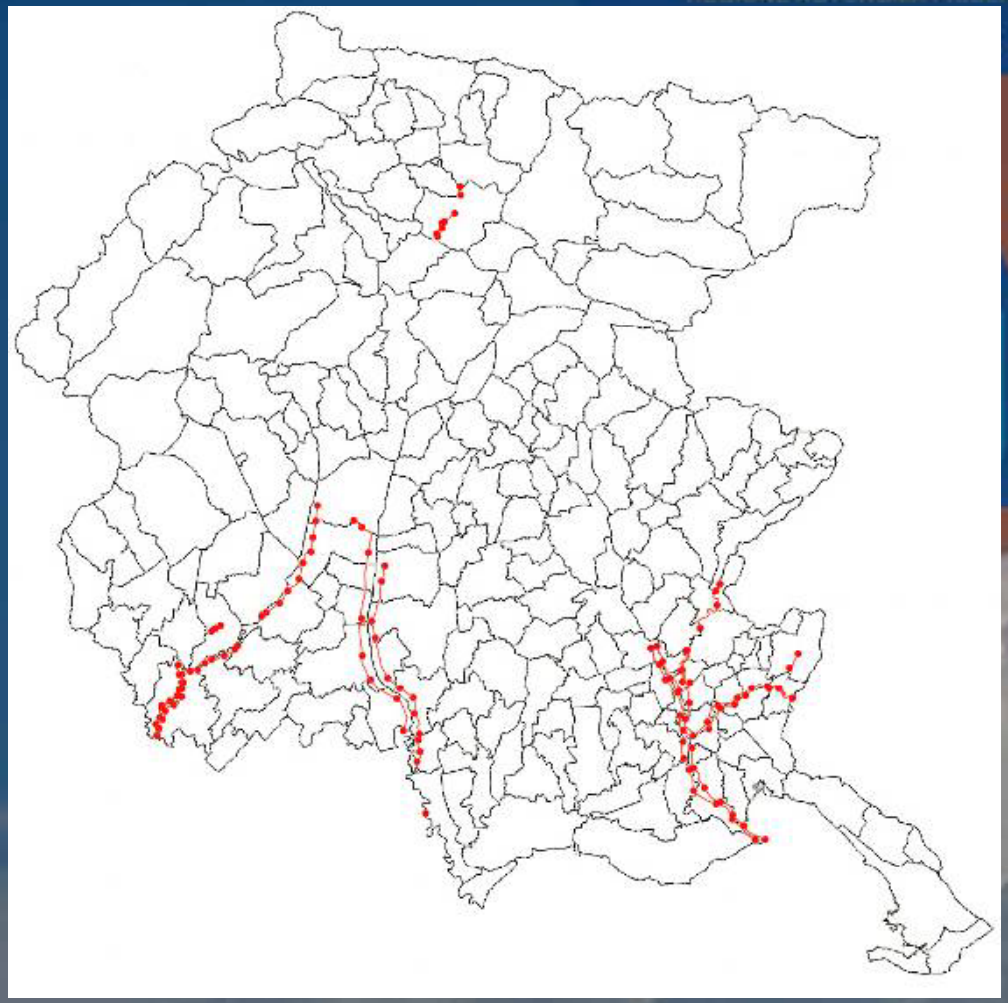
II) Monitoring and meteorological alerting phase → Task of PCR

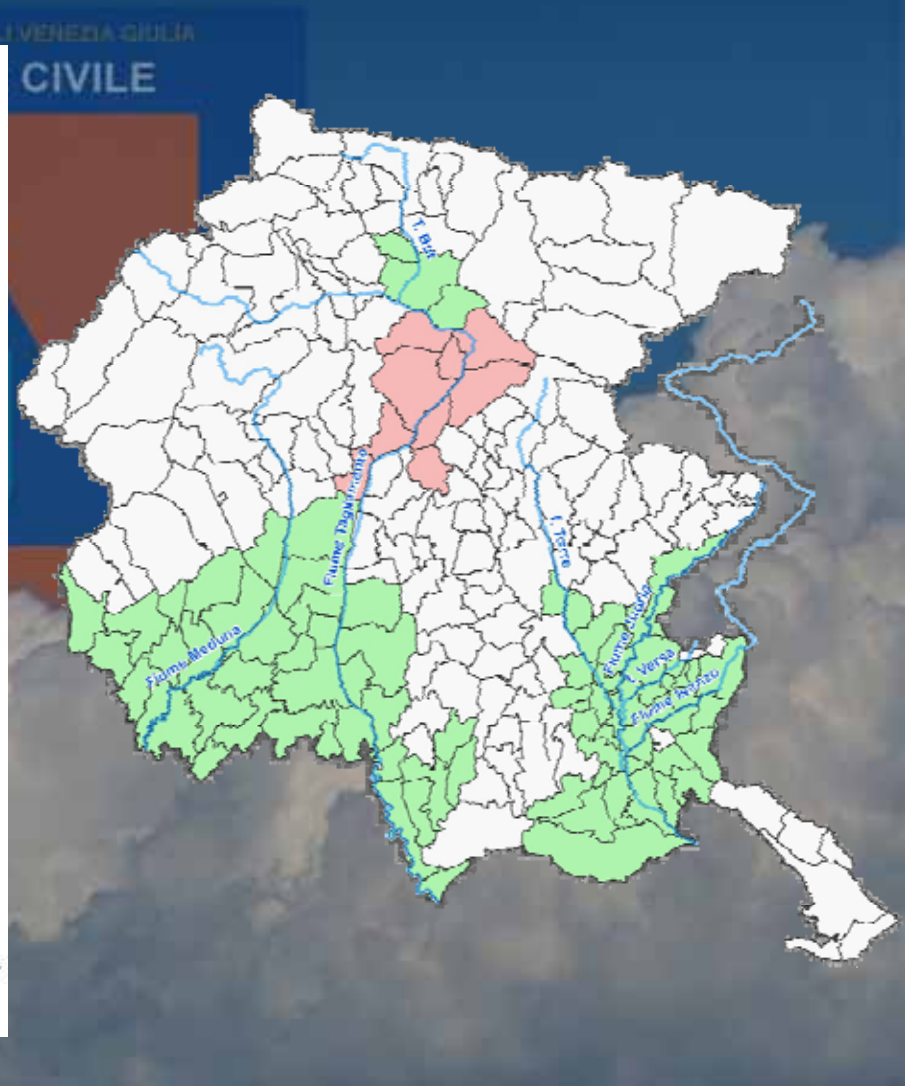
III) Embankment surveillance phase → Task with support of volunteers of Civil protection Municipality Groups

IV) Management and quick intervention phase for prevention ed restoration → task of PCR and DPLLPP

Embanked rivers where the high-water service is organized

This service is organized for the selected and classified reaches of the main water courses where embankments are of first and second or third category of importance.





Preliminary planning phase

Civil protection performed these preliminary activities:

I. Identification of the surveillance reaches for each river and preparation of illustrative documents for the surveillance service to be done.

II. Planning of personnel employment function of different alert levels (according to the identified thresholds) :

- Guard level : activation of hydraulic officers;
- 1° presidium level : activation of surveillance of embankments with volunteers of civil protection municipality Groups;
- 2° presidium level : intensification of surveillance with more volunteers of civil protection municipality Groups

III. Alert levels for each individual reach were determined on reference hydrometers fixing water level thresholds.

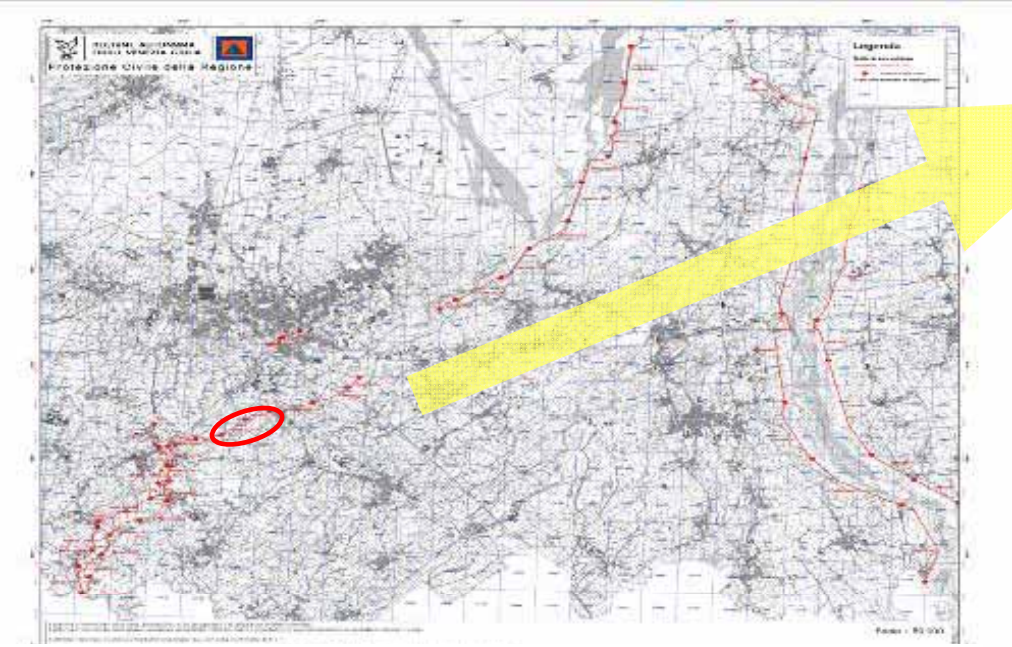
Embankment surveillance phase

Meduna river - Prata di Sopra (PN) - 27/11/2002

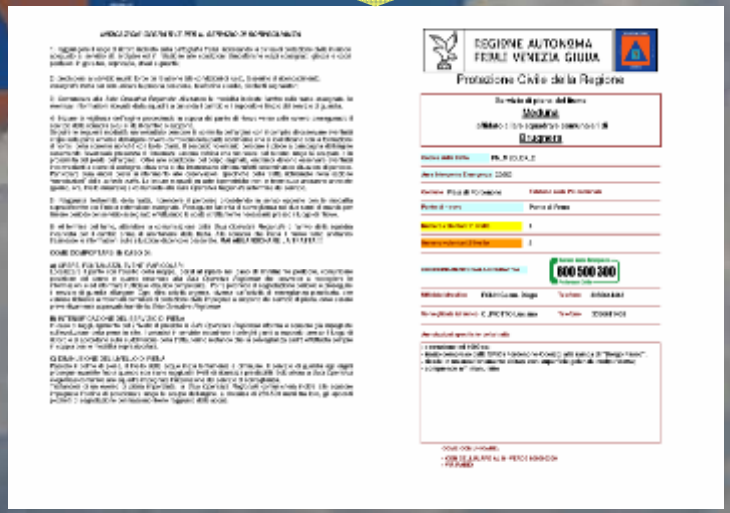
Livenza river – Loc. Traffe (PN) - 28/11/2002

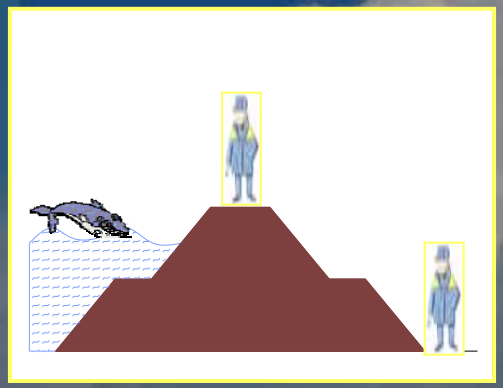
Civil protection municipality Groups are in charged of the surveillance of the embankments in order to permit a prompt "hydraulic quick intervention" in case of damages avoiding ruptures and flooding of inhabited areas

Support cartography for High-water service



Cartografia delle tratte di sorveglianza





REGIONAL OPERATIVE ROOM

- Coordination of high-water service
- Technical-scientific activity
- Institutional relations

Coordination of high-water service: alerting levels

Continouous Monitoring of river levels on reference points to activate planned actions:

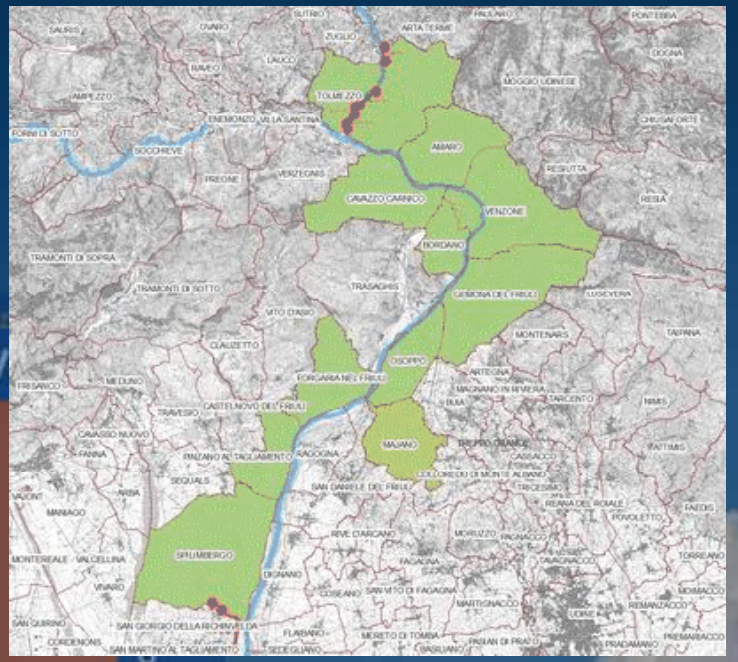
Attention (Guard) level : activation of hydraulic officers;

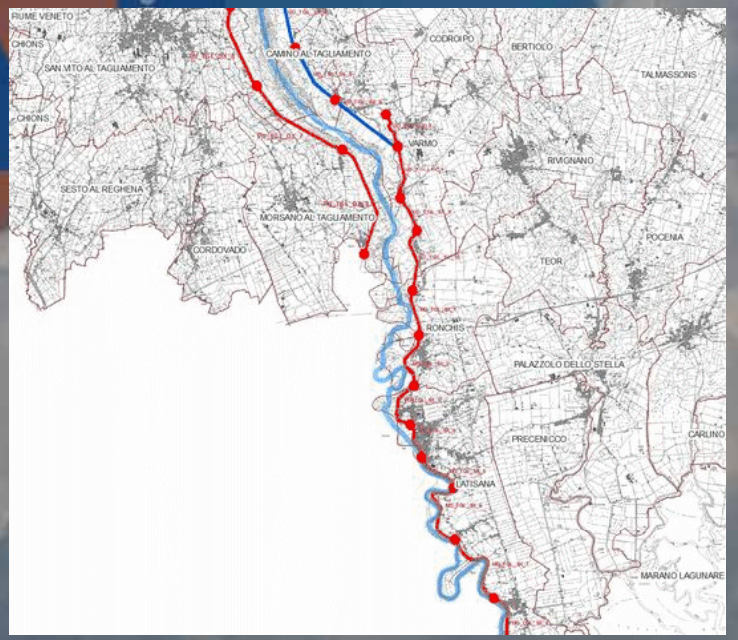
1° presidium level : activation of surveillance of embankments with volunteers of civil protection municipality Groups;

2° presidium level : intensification of surveillance with more volunteers of civil protection municipality Groups

Reference hydrometers

Coordination of high-water service: Real-time GIS implementation





Immediate perception and visualization of situation on field

High-water service: activity on field

Embankment surveillance with men has an irreplaceable importance in order to allow prompt intervention,

avoiding that an high-water event becomes a catastrophic inundation

REALISATION OF OPERATIVE PROCEDURES FOR HYDROGEOLOGICAL RISK

JOINT ANALYSIS OF HYDROGEOLOGICAL RISK SCENARIOS

Hydrogeological problems are object of joint analysis by technicians of PCR and technicians of the Municipalities, based on direct experiences of phenomena happened on their territory and on the numerous defence and prevention works realised after most recent flood events.

HYDROGEOLOGICAL RISK SCENARIOS

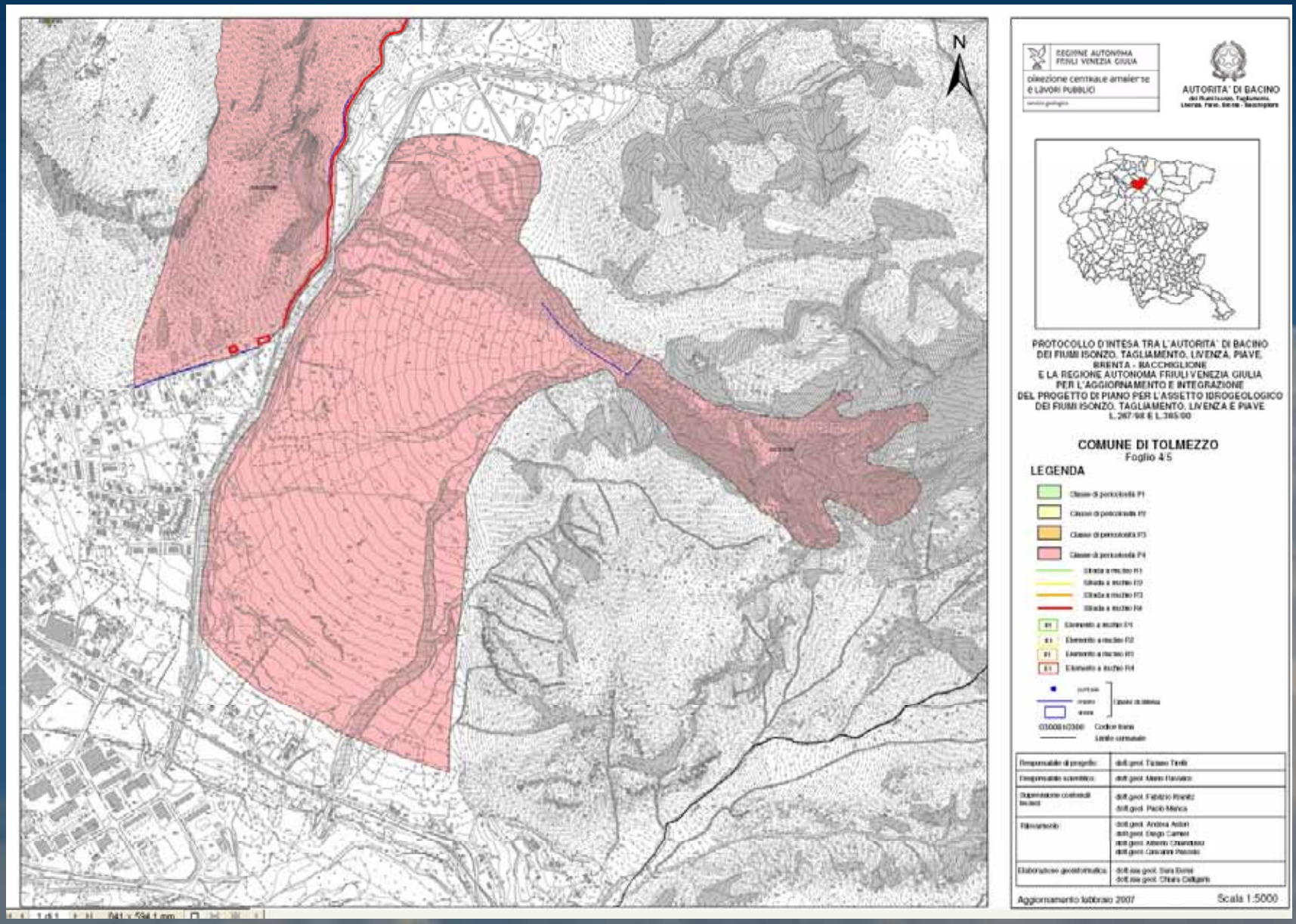
GEOLOGICAL AND HYDRAULIC DANGER AREAS

- PAI maps

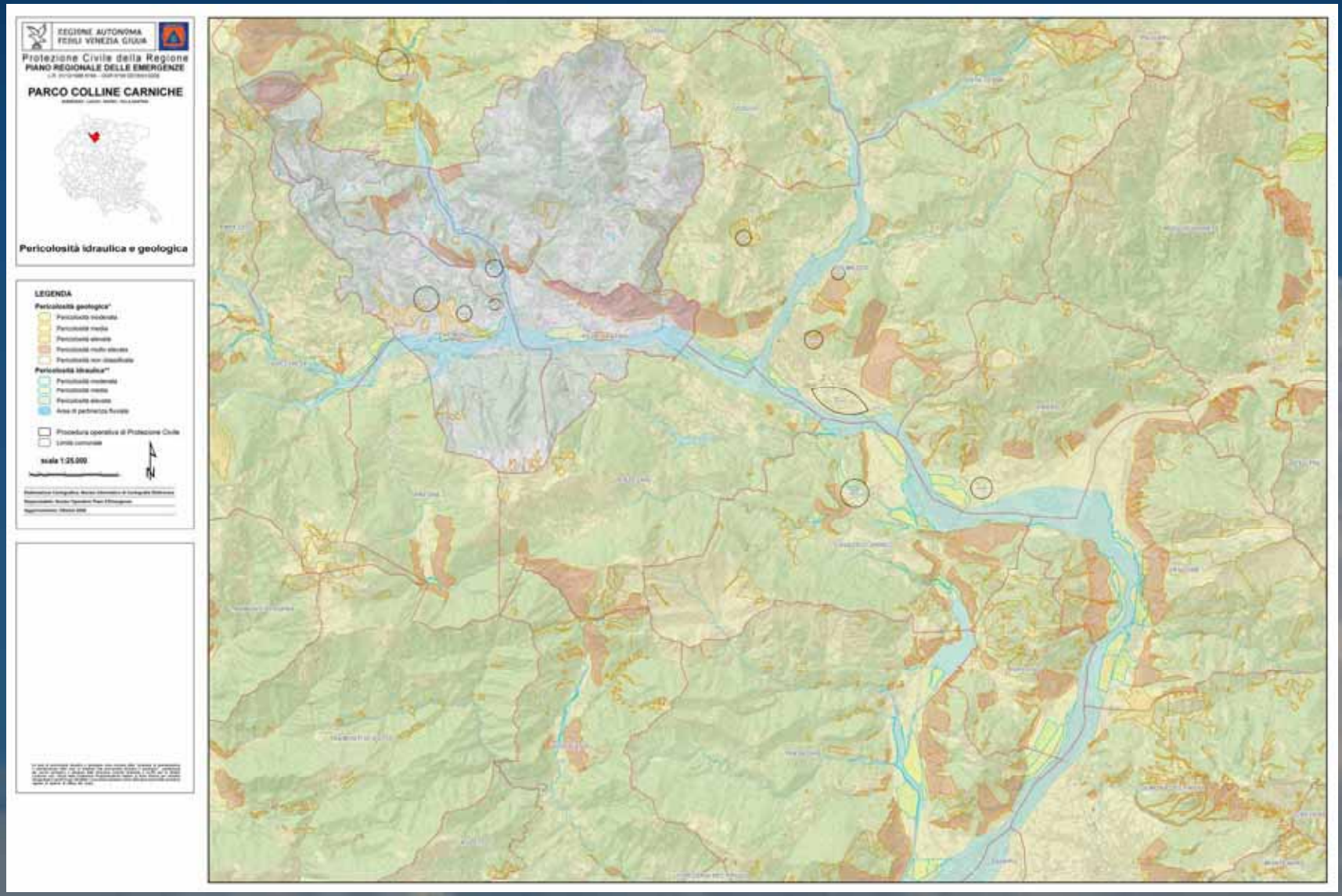
- Civil protection working maps with updated information from Geological and Hydraulic office of FVG Region

-> for Civil protection purposes are also carefully analysed all situations that can represent a threaten to public safety during flood events (road underpasses, artificial drainage systems, correlation with other risks, …)

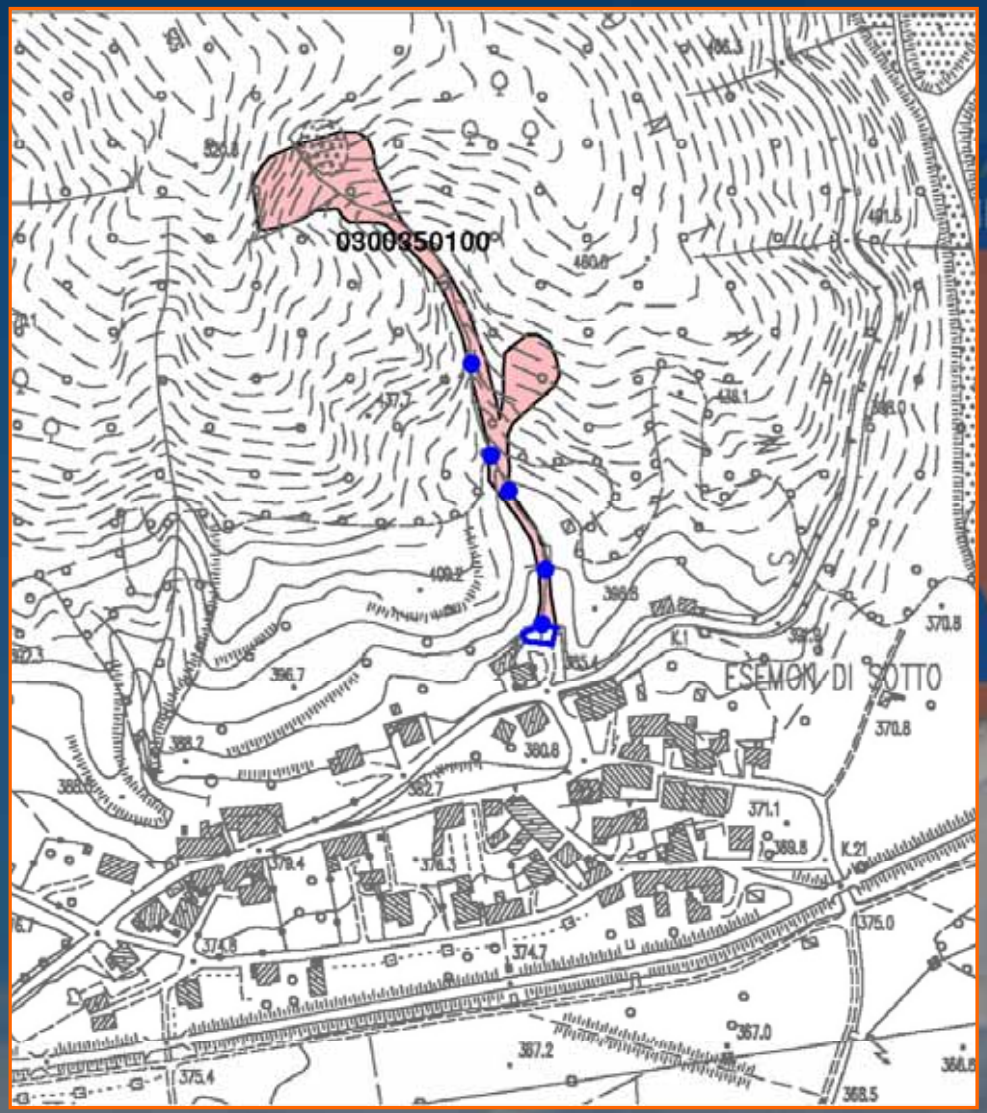
PAI map : Rivoli Bianchi - Tolmezzo



Regional working map of geological and hydraulic danger areas :
PARCO COLLINE CARNICHE



Example: geological danger P4 over Esemon di Sotto village



COMUNE DI ENEMONZO

Foglio 2/2

LEGENDA

- Classe di pericolosità P1
- Classe di pericolosità P2
- Classe di pericolosità P3
- Classe di pericolosità P4
- Strada a rischio R1
- Strada a rischio R2
- Strada a rischio R3
- Strada a rischio R4
- E1 Elemento a rischio R1
- E1 Elemento a rischio R2
- E1 Elemento a rischio R3
- E1 Elemento a rischio R4
- puntuale
- lineare
- areale

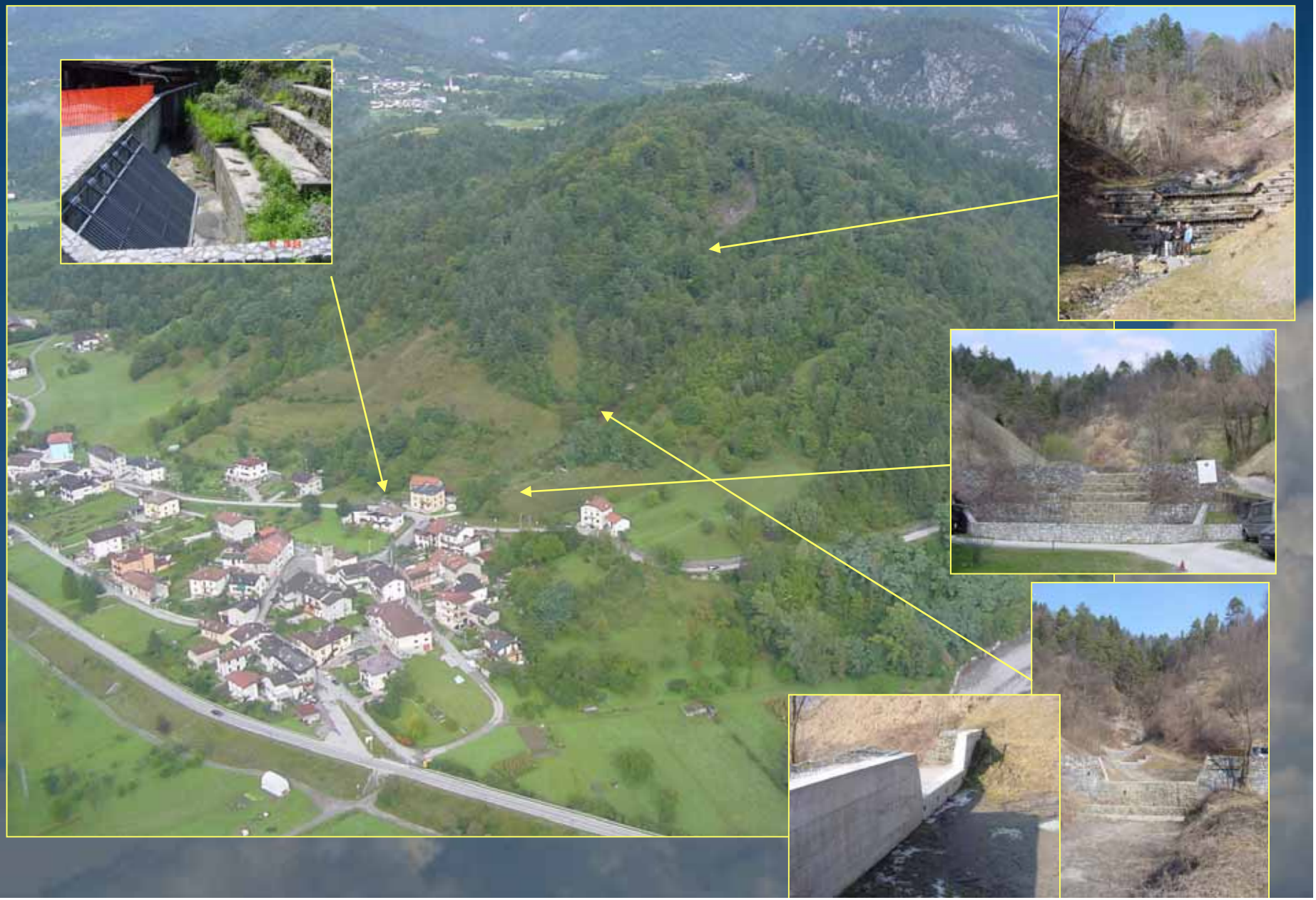
Opere di difesa

0300810300 Codice frana

Limite comunale

Frana puntuale

Civil protection works realised after flood event of year 2000 allowed to put in safety the village

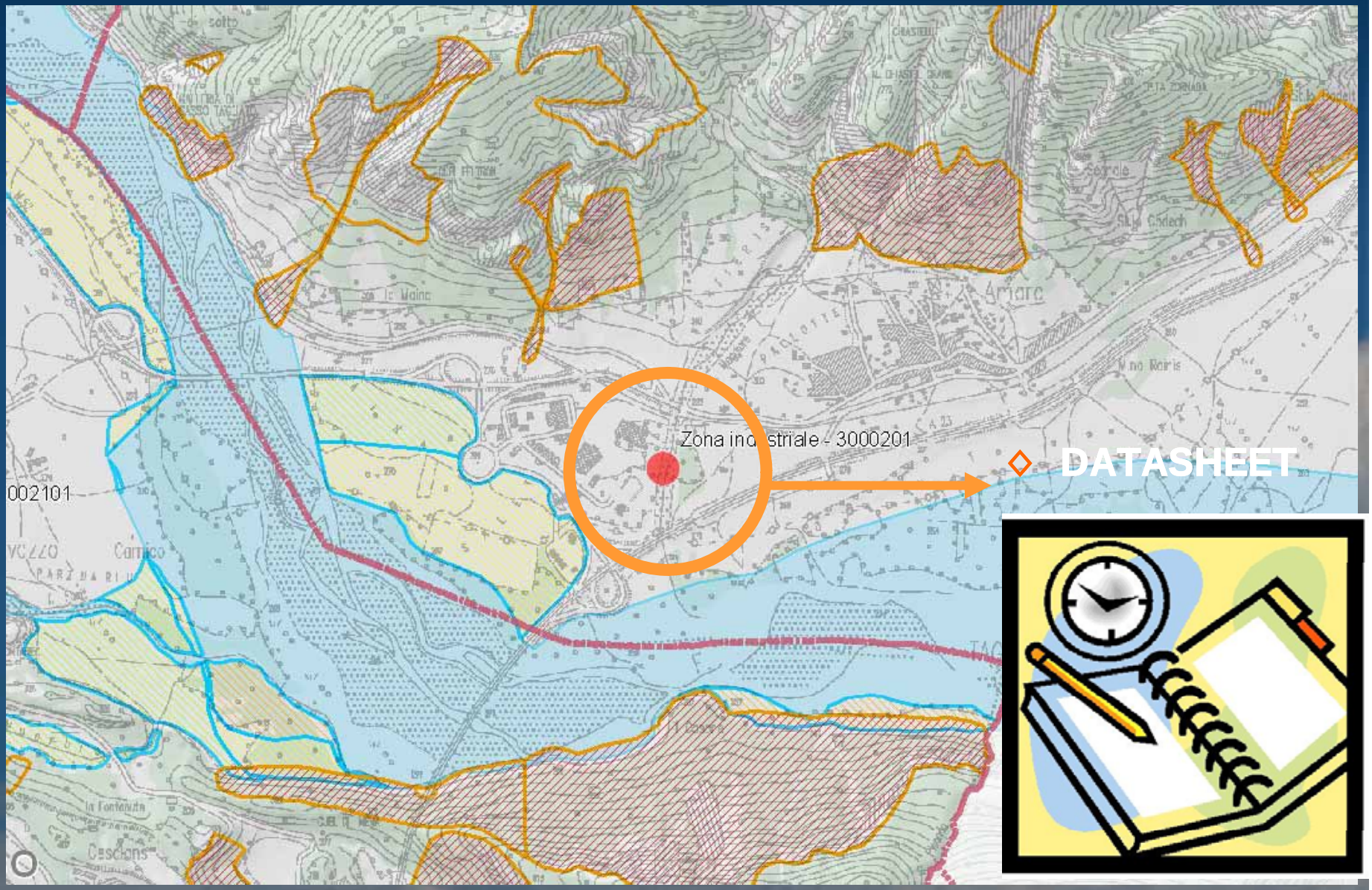


CIVIL PROTECTION OPERATIVE PROCEDURES

Table of first "test" procedures

n°	MUNICIPALITY	SITE	TYPE OF PROBLEM	PREVENTION ACTIVITY	EMERGENCY ACTIVITY	POST EVENT ACTIVITY
1	AMARO	Zona Industriale	**Esondazione Rio Maggiore**	monitoraggio piano delle ghiaie		monitoraggio piano delle ghiaie
2	CAVAZZO CARNICO	capoluogo	**esondazione della roggia**	controllo dei manufatti di regolazione		controllo dei manufatti di regolazione
3	ENEMONZO	Quinis	**Esondazioni del Torrente Fornace**	Controllo opere idrauliche di regolazione		
6		Esemon di Sotto	**Colate del rio Don (Rio Mezzolo)**	monitoraggio zona di alimentazione delle colate e dei bacini di trattenuta		monitoraggio zona di alimentazione delle ciolate e dei bacini di trattenuta
7		Capoluogo	**Esondazioni del Rio Ribidis**	Controllo opere idrauliche di regolazione		Controllo opere idrauliche di regolazione
9	FORNI DI SOPRA	Torrente Tolina	**Piene improvvise**	controllo stabilità versante parte alta bacino		
10		Vico	**Esondazione rio Comis**	Controllo opere di imbocco delle tombinature		Controllo opere di imbocco delle tombinature
11		Confluenza Dria-Tagliamento	**Esondazione Tagliamento**			Verifica delle opere di difesa e dei depositi alluvionali presso la confluenza
12		Impianti Sportivi	**Esondazione Tagliamento**			

CIVIL PROTECTION OPERATIVE PROCEDURES



CIVIL PROTECTION OPERATIVE PROCEDURES

- Page 1

- Amaro

Regione Autonoma Friuli-Venezia Giulia
PROTEZIONE CIVILE DELLA REGIONE
Nucleo operativo piani di emergenza
PIANO REGIONALE DELLE EMERGENZE
L.R. 31/12/1986 N°64 – DGR N°99 dd 18/01/2008

COMUNE DI AMARO
PROCEDURE OPERATIVE PER IL RISCHIO IDROGEOLOGICO
Località: ZONA INDUSTRIALE

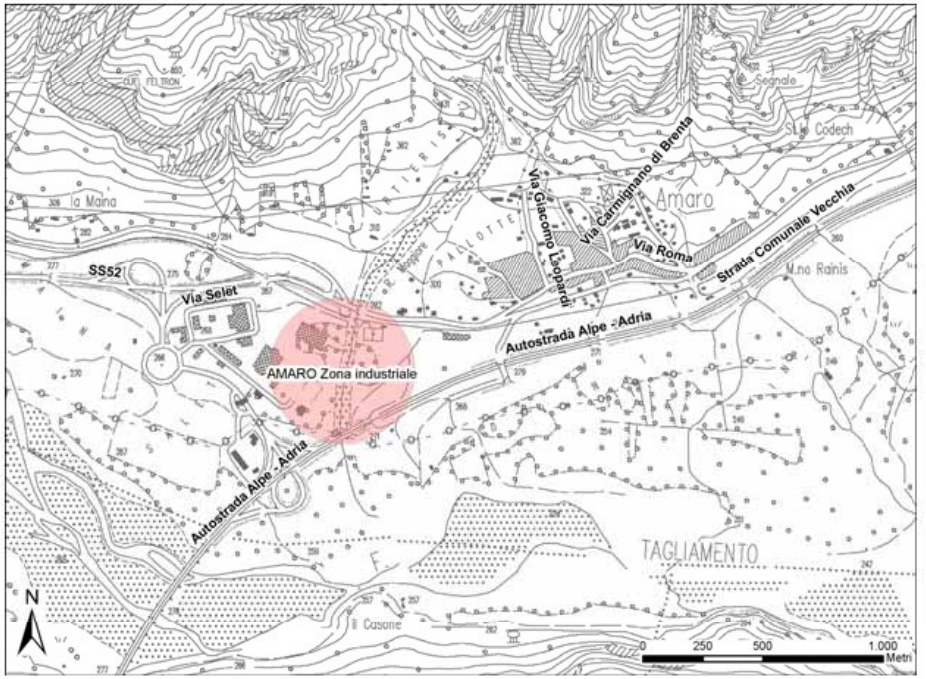
CODICE 30092281
ELABORATO
N°01

Data aggiornam.	Versione
29/10/2008	1.0

Descrizione: Esondazione del Rio Maggiore
Cause: precipitazioni intense concentrate

DINAMICA DEL FENOMENO: A seguito di **precipitazioni intense concentrate** il materiale ghiaioso trasportato a valle dal Rio Maggiore può sovralluvionare l'alveo e determinare l'esondazione del Rio con interessamento della Zona Industriale di Amaro.

Eventi significativi precedenti:



CIVIL PROTECTION OPERATIVE PROCEDURES

- Page 2

- Amaro

PROCEDURE

PRIMA DELL'EVENTO

- Verificare dal punto di osservazione il livello del piano delle ghiaie e che non sia presente materiale ingombrante nel letto del Rio Maggiore (es. tronchi d'albero). Segnalare eventuali ostacoli al Numero Verde 800 500 300.
- Monitorare la situazione dai punti di osservazione prestabiliti.
- Informare gli abitanti ed i titolari delle imprese della possibile evoluzione meteorologica e tenersi pronti per eventuali situazioni di pericolo

DURANTE L'EVENTO

- **Mettersi in sicurezza**
- Effettuare la sorveglianza da lontano, ed avvisare degli eventuali pericoli gli abitanti e le imprese.

DOPO L'EVENTO

- Verificare il livello raggiunto dal piano delle ghiaie, ed eventuali danni subiti dalle opere presenti

PROCEDURE DI SICUREZZA E RISCHI PER I VOLONTARI	PERICOLOSITA'	BASSA	MEDIA	ELEVATA	MOLTO ELEVATA

- Effettuare tutte le operazioni seguendo le procedure di sicurezza vigenti ed indossando i dispositivi di protezione individuale;
- In caso di qualsiasi dubbio sulla sicurezza o sull'evoluzione della situazione rimanere fuori dalla zona dell'evento;
- Di notte ed in caso di scarsa visibilità stare lontani dalla zona;
- Durante l'evento non entrare nel letto del Rio, non avvicinarsi troppo al ciglio degli argini
- In caso di rischio di tracimazione allontanarsi velocemente verso una posizione più elevata e/o verso i punti di raccolta

ELEMENTI A RISCHIO

Attività industriali, Campo Calcio, S.S. 52 "Carnica", **(C)** Ponte su strada comunale; **(D)** autostrada A23 Palmanova-Tarvisio

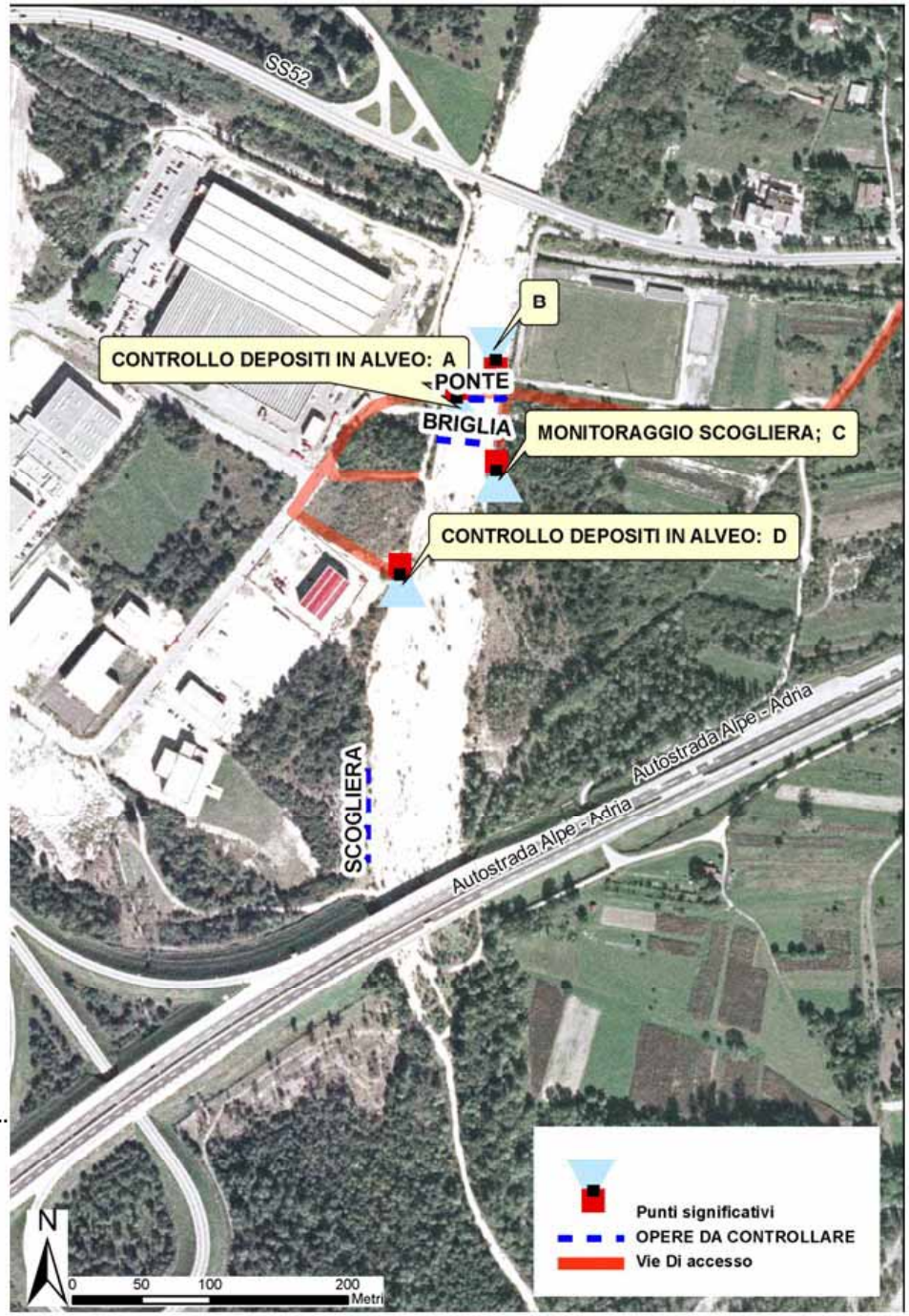
OPERE DI DIFESA ESISTENTI

(A) Argini sponda destra e sinistra a valle strada statale **(B)** argini a monte strada statale e argine in scogliera a monte ponte A23

CIVIL PROTECTION OPERATIVE PROCEDURES

- Page 3

- Amaro



CIVIL PROTECTION OPERATIVE PROCEDURES

- Page 4

- Amaro

RIFERIMENTI

ABITAZIONI·/·COSTRUZIONI¶

Data¤	ANNOTAZIONI¤	Compilatore¤
¤	¤	¤
¤	¤	¤
¤	¤	¤
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Prevention, quick intervention and restoration works

3 febbraio 2003

Maintenance of water courses

Meduna river – Visinale di Sopra (Pasiano di Pordenone)

Cut of vegetation inside the bed of the river

14 aprile 2003

Flood 2002 – Pordenone embankment's break

Steel screen

Flood 2003 - Ugovizza

Gravel and material removal
from the bed of the creek

Concrete screening of embankments - Latisana

Preparedness

for civil protection personnel, volunteers and population

Cleaning of bed of Torre creek

Exercise: building a tent camp

Meetings and exercises at school with civil protection personnel, volunteers and students

Web Portal of Friuli Venezia Giulia Civil Protection

www.protezionecivile.fvg.it

Thanks for your attention !

Aldo Primiero – Protezione civile della Regione
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www.protezionecivile.fvg.it