INBO
International Network of Basin Organizations

EUROPE INBO 2007

International conference on the implementation of the European Water Framework Directive

Roma, Complesso San Michele a Ripa, 8 – 10 November 2007

The experience of the Italian Basin Authorities:

Interregional Magra River Basin Authority

Basin planning: protection of rivers and from rivers!

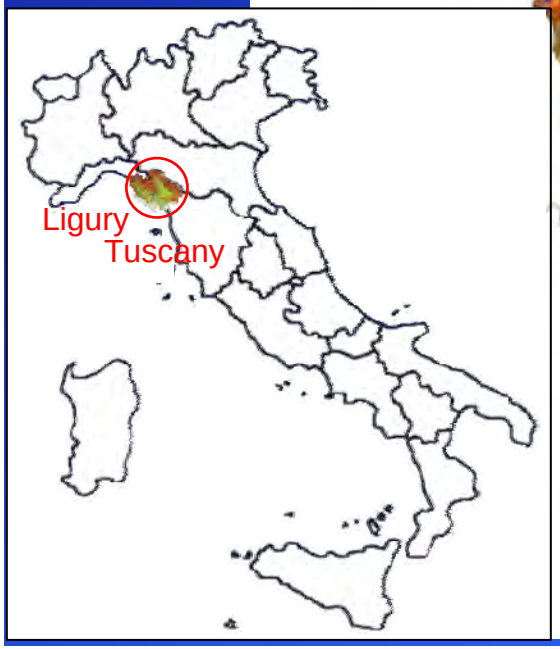
Francesca Pittaluga

Giuseppe Sansoni

Magra river basin

max watershed height: 2017 m a.s.l.
200-years discharge: 7300 m^3/s

Length: 69,5 km
Surface: 1698 km^2

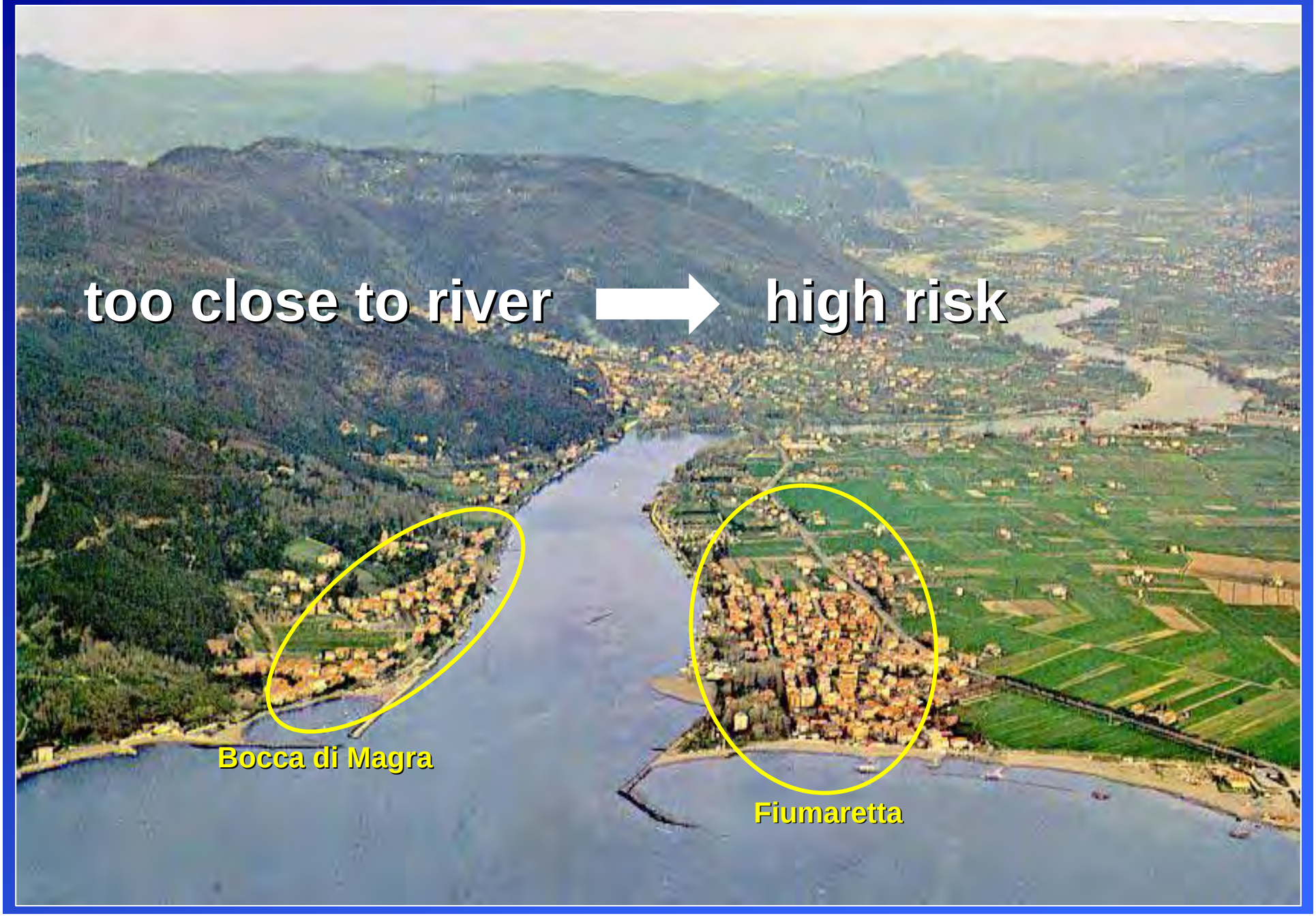


Varese Ligure
Pontremoli
Magra river
Vara river
Brugnato
Aulla
Fivizzano
La Spezia
Carrara
Ligurian sea
Magra River Basin

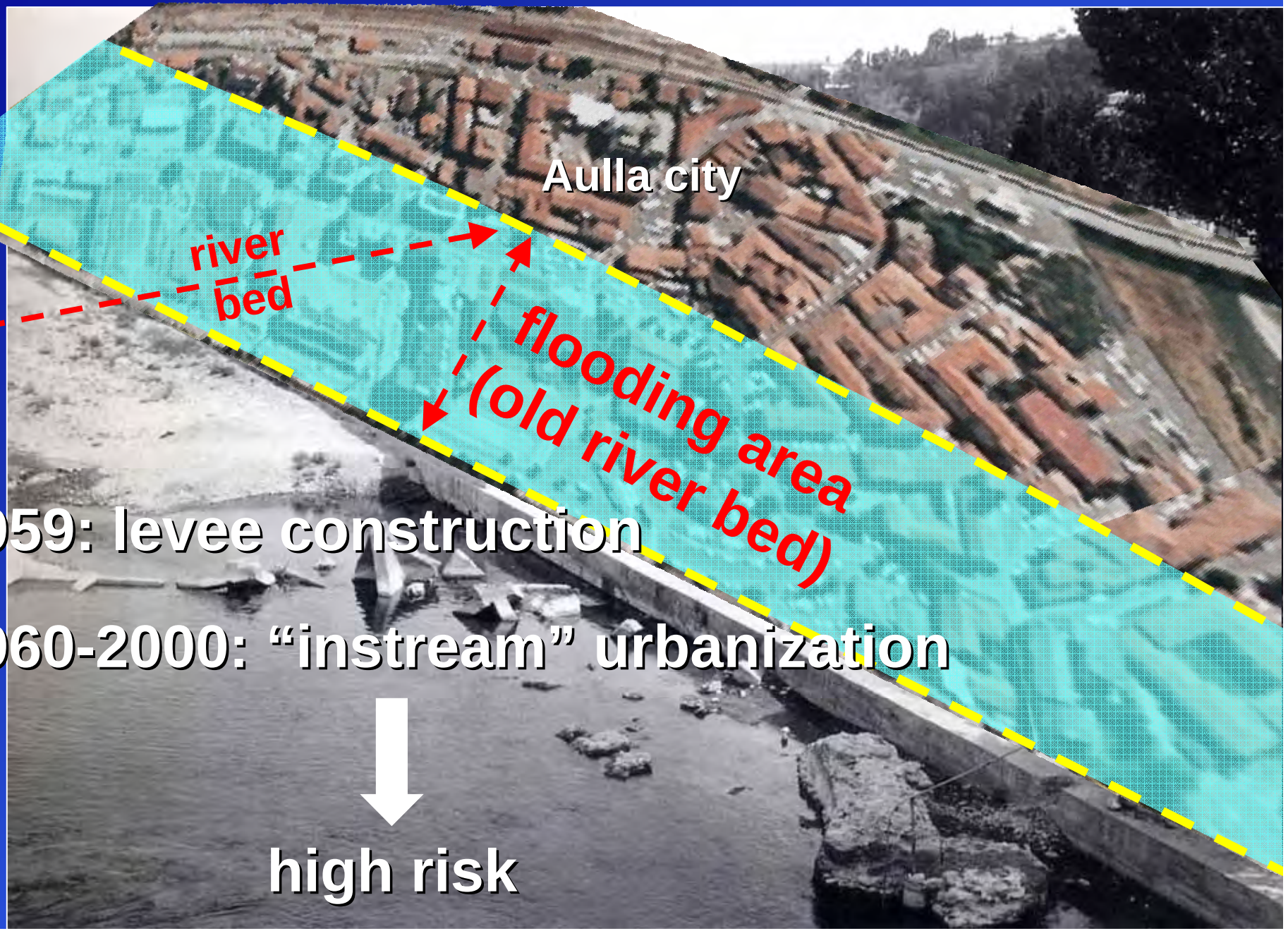
Bad inheritances

- Unwise urbanization → flood risk
- Hydroelectric and irriguous derivations → scarce water in rivers
- River bed incision (caused by past gravel mining) → coast erosion
  - water table lowering → drinking water: poor quantity
  - salt intrusion → drinking water: poor quality
- Short-sighted approach
  - canalization works (levees, bank protections…) → ecological status degradation

Problems: flood risk



Problems: flood risk



1959: levee construction

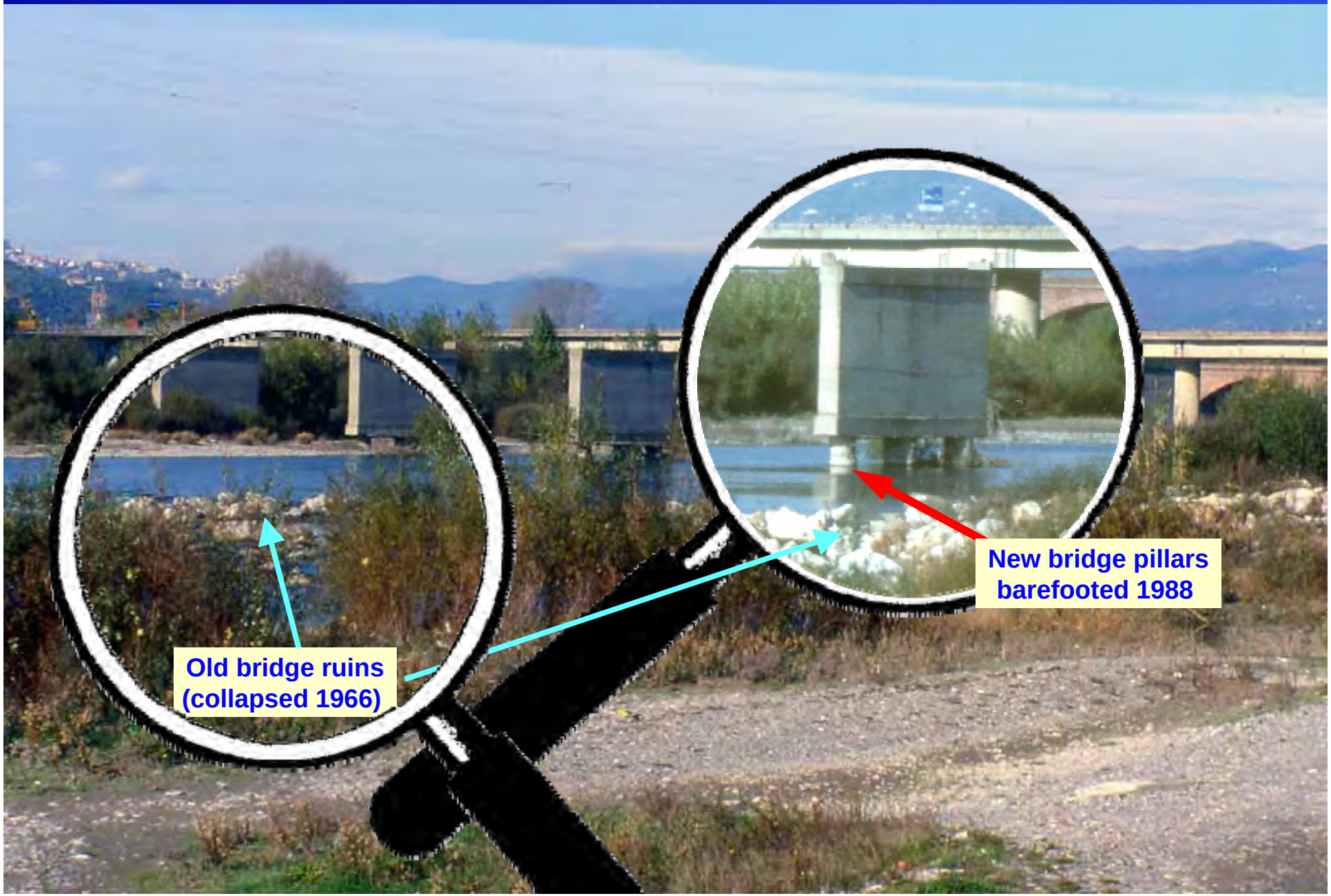
1960-2000: “instream” urbanization

high risk

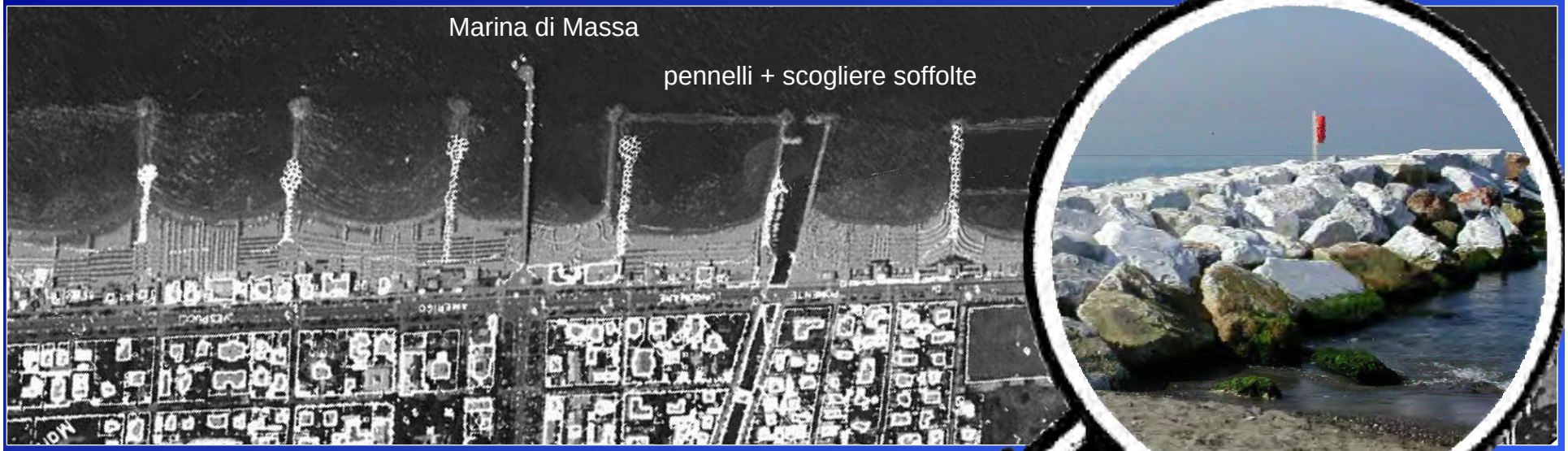
Problems: old gravel mining consequences

1950-1970
heavy gravel mining

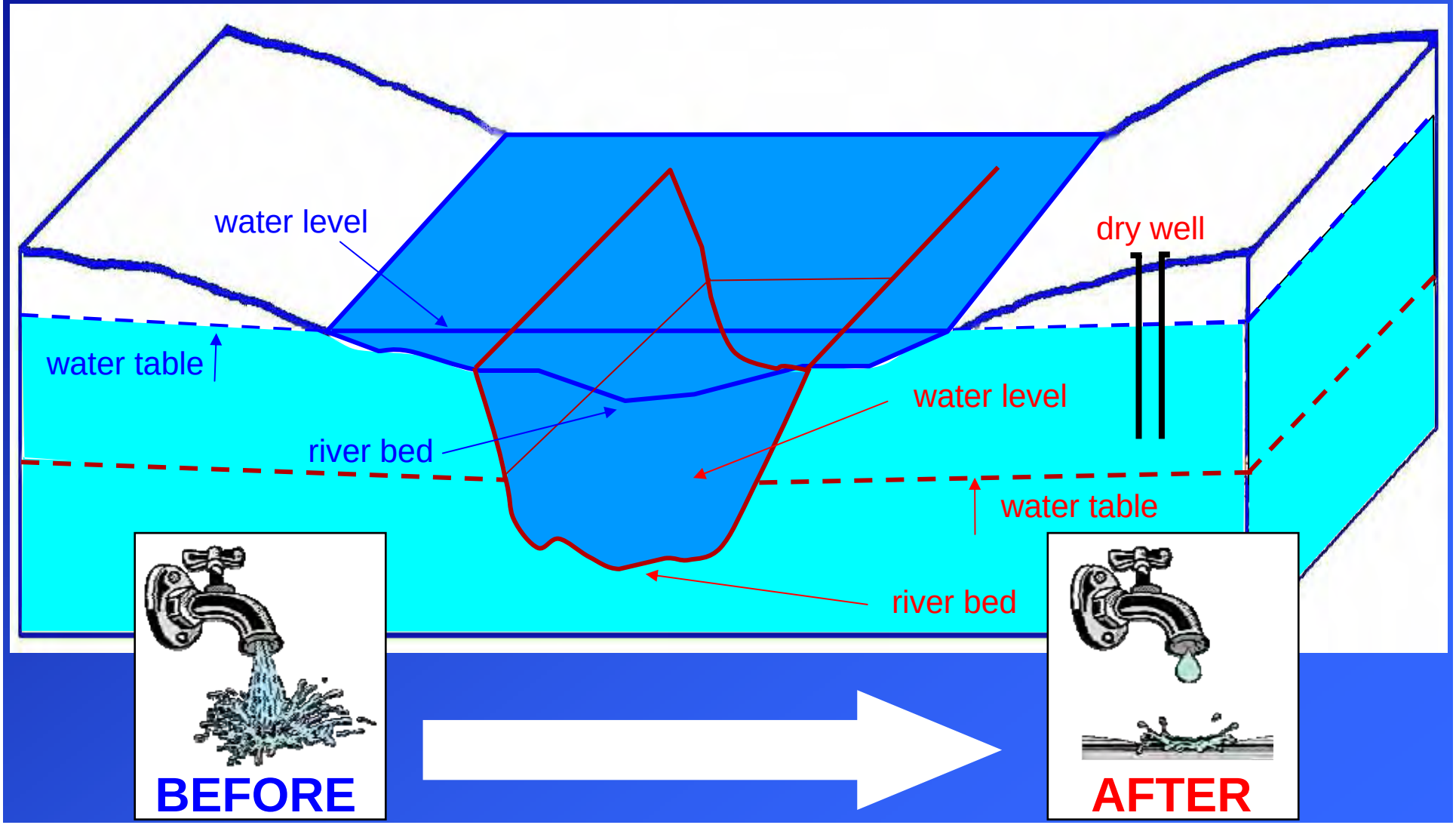
Problems: old gravel mining → bed incision



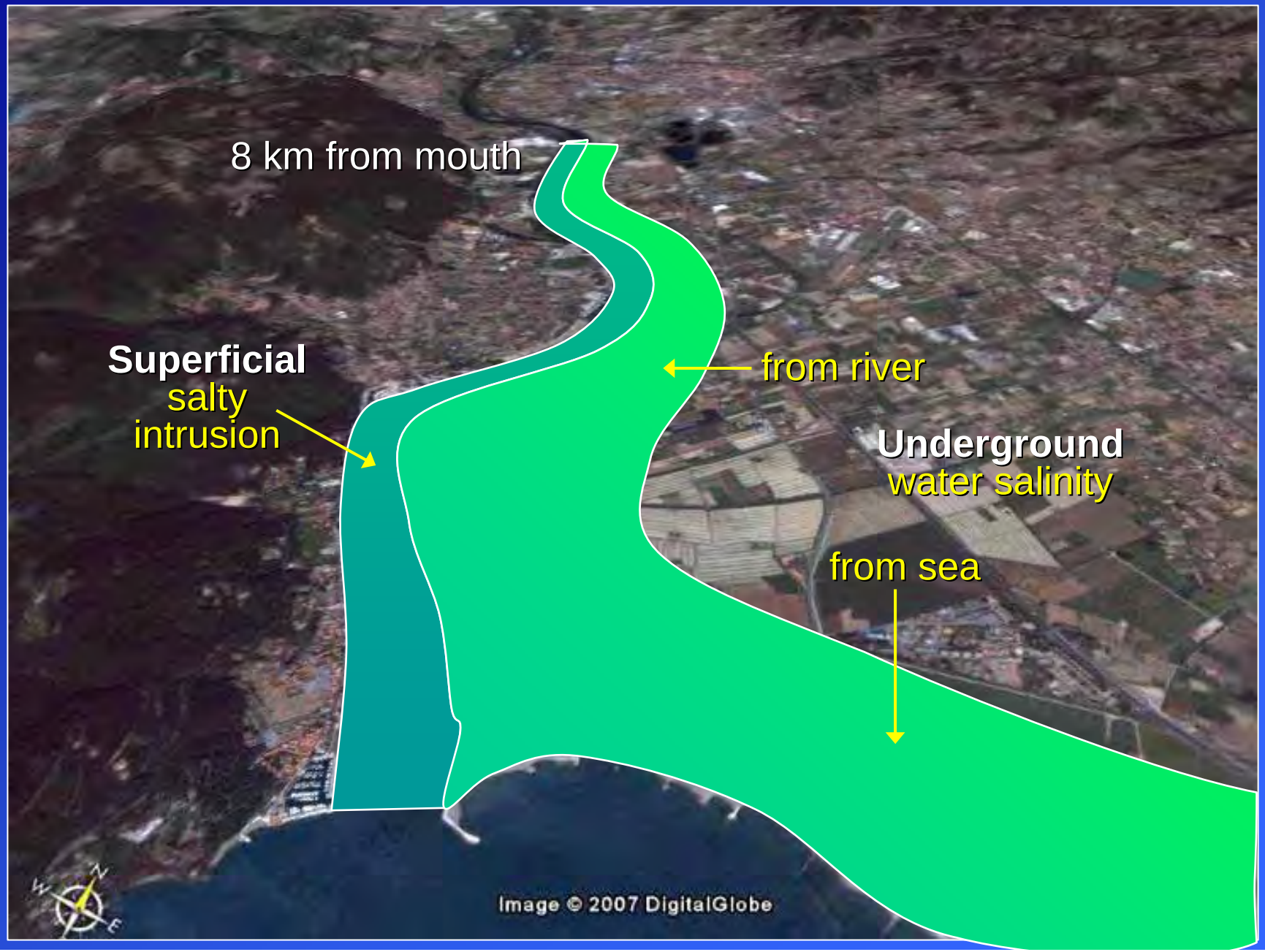
Problems: gravel mining → coast erosion



Problems: gravel mining → bed incision and narrowing → water level lowering → water table lowering



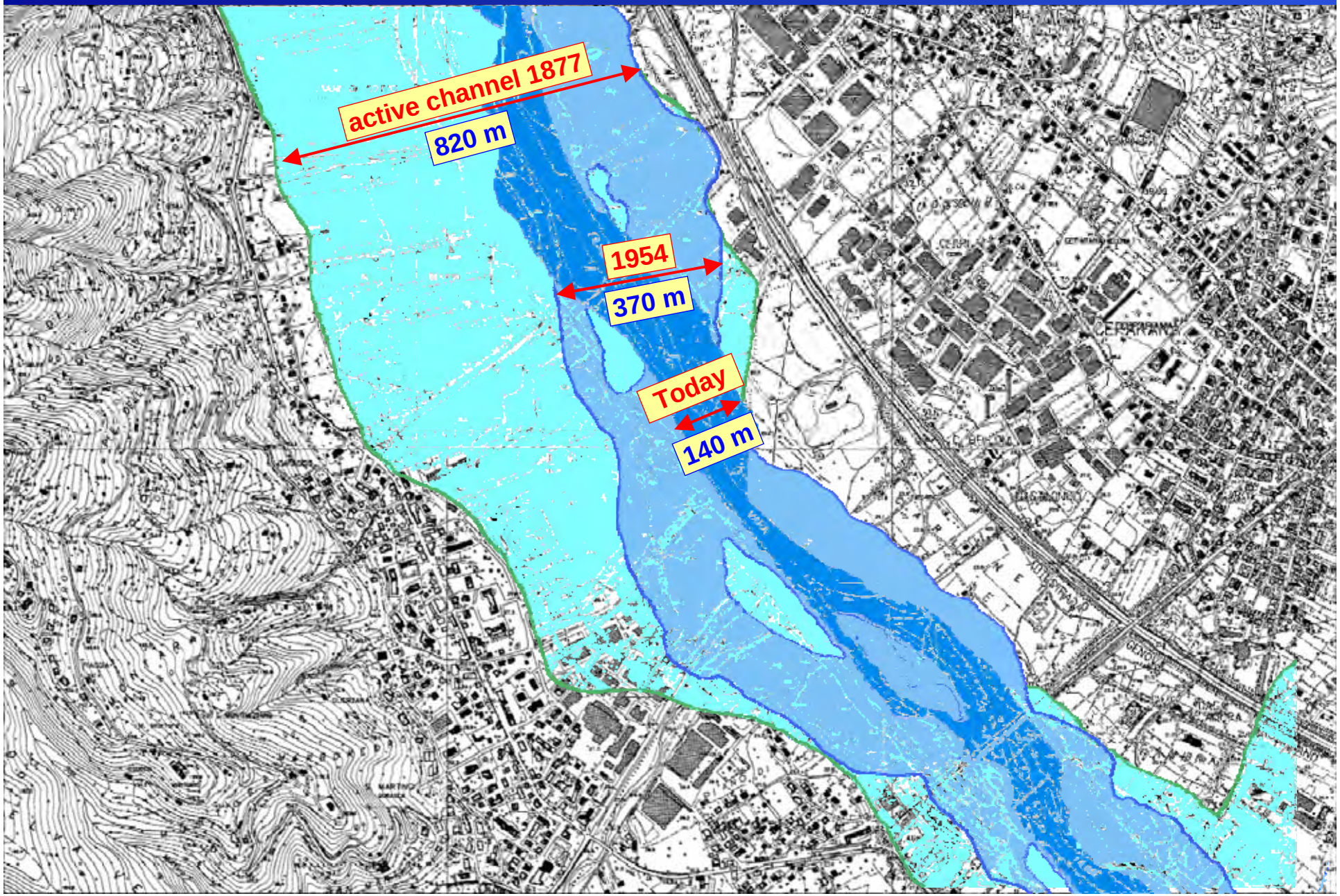
Problems: gravel mining → salty intrusion



Problems: bed incision and narrowing → aquatic and terrestrial habitat loss

"ghost" habitats!

Problems: last century narrowing



Problems: hydroelectric and irriguous derivations

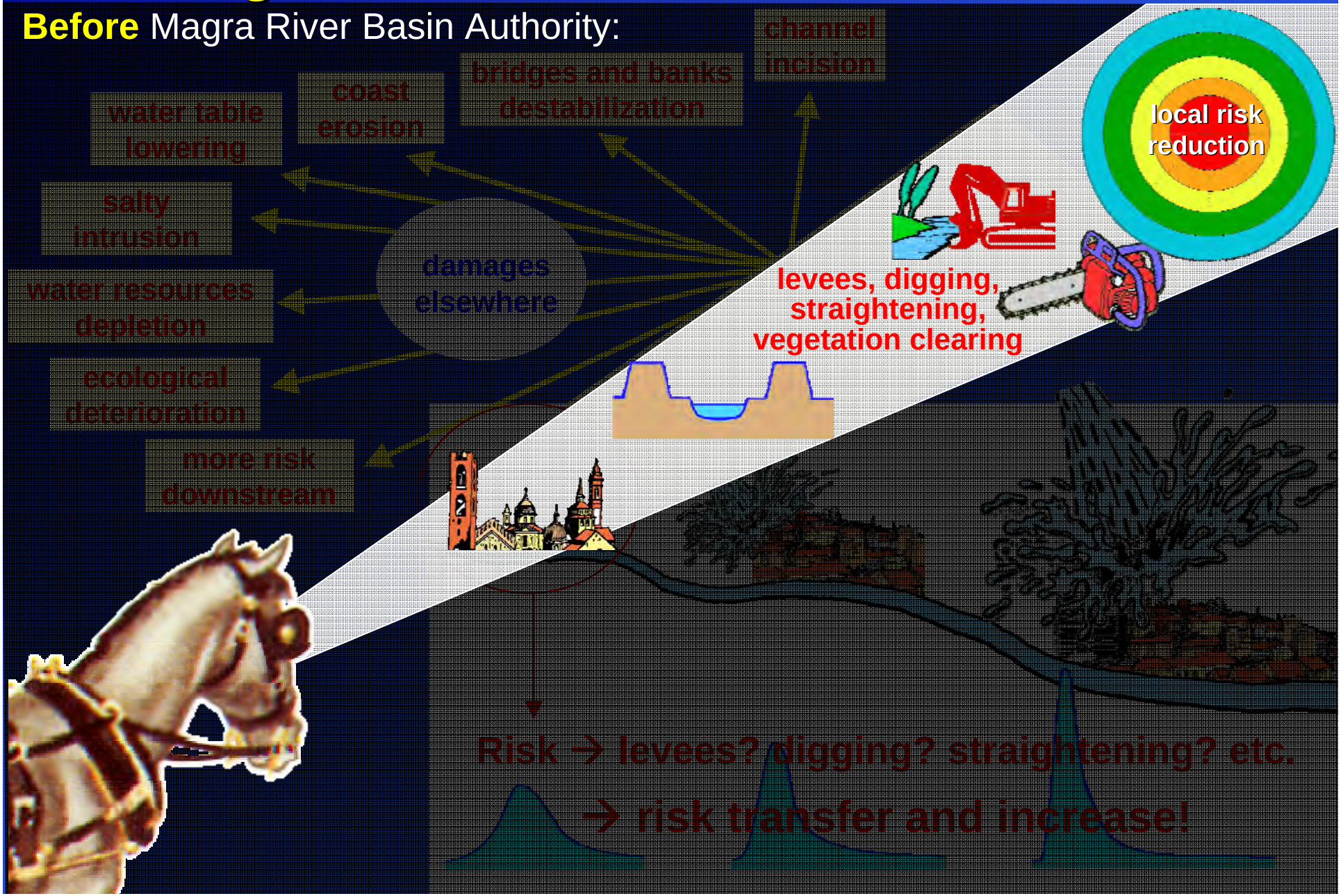
Magra river: average discharge ~ **60** m^3/s
Magra river: av. low discharge ~ **20** m^3/s
1996 existing derivations: ~ **24** m^3/s
1996 new requests: ~ **16** m^3/s

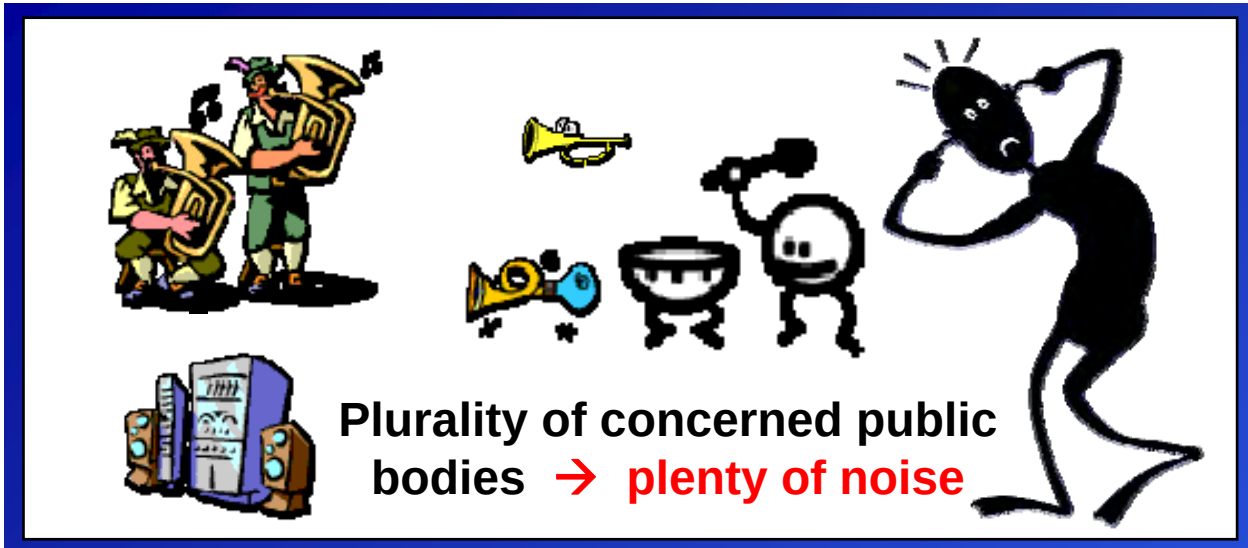
(Before River Basin Authority)

Problems: short-sighted vision

→ only advantages visible (here and now)
→ disadvantages invisible (elsewhere and tomorrow)

Before Magra River Basin Authority:





Plurality of concerned public bodies → plenty of noise

Before Magra River Basin Authority

After

change of tune!

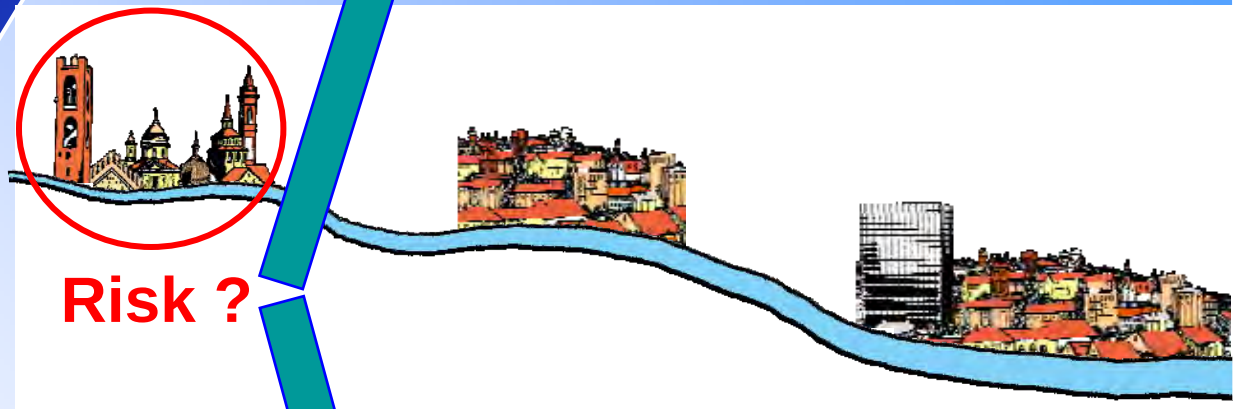
Far-sighted vision

After Magra River Basin Authority:

- **multi-objective approach** (all advantages and disadvantages considered at the same time)
- **here** and **elsewhere, now** and **tomorrow**

Risk reduction

- **Local**
- **Downstream and upstream**
- **Now and tomorrow**



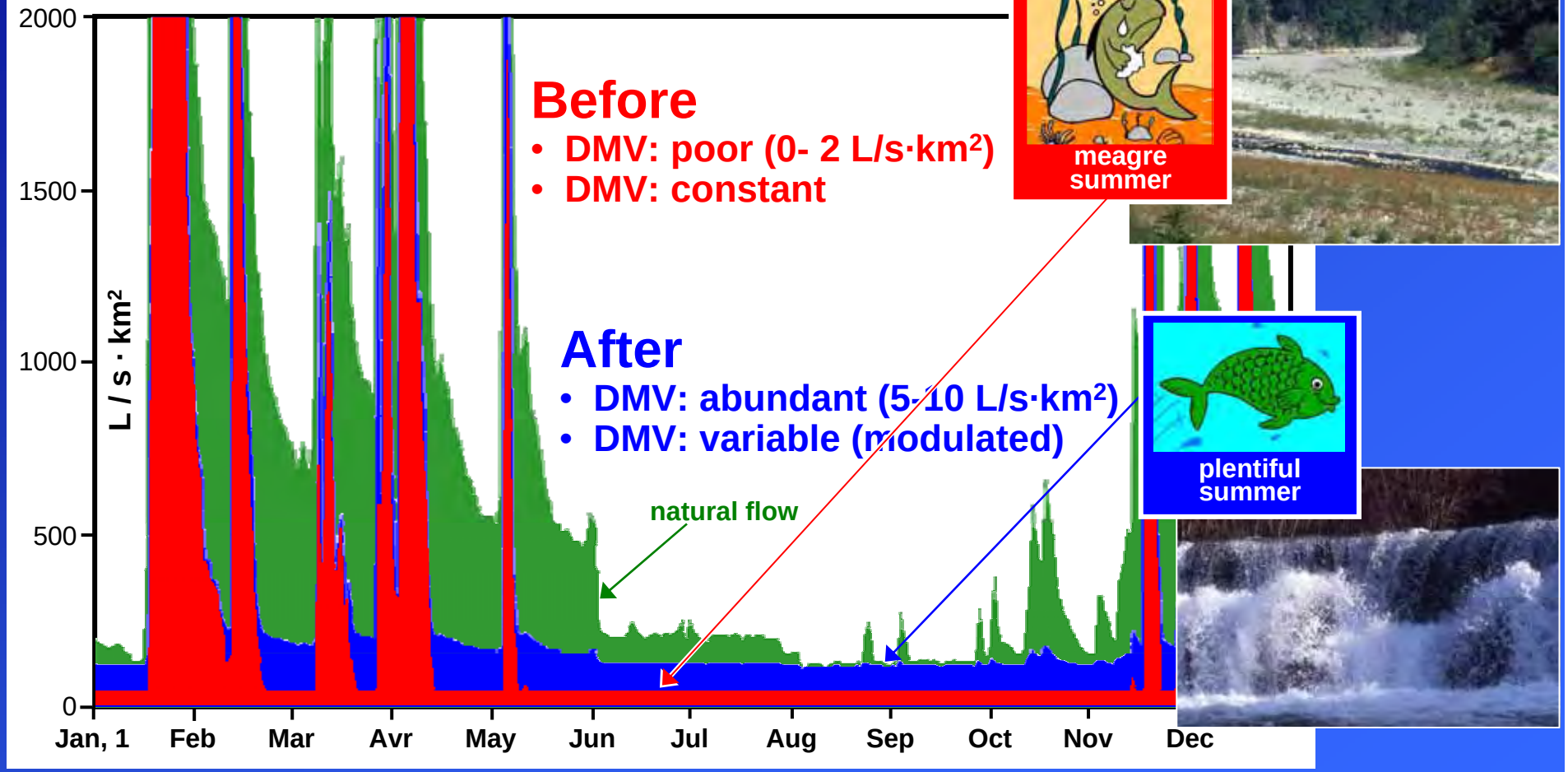
Other objectives

- **Incision reduction**
- **Coast erosion reduction**
- **Water table raising**
- **Water resources re-establishing**
- **Salt intrusion pushing back**
- **Ecological improvement**

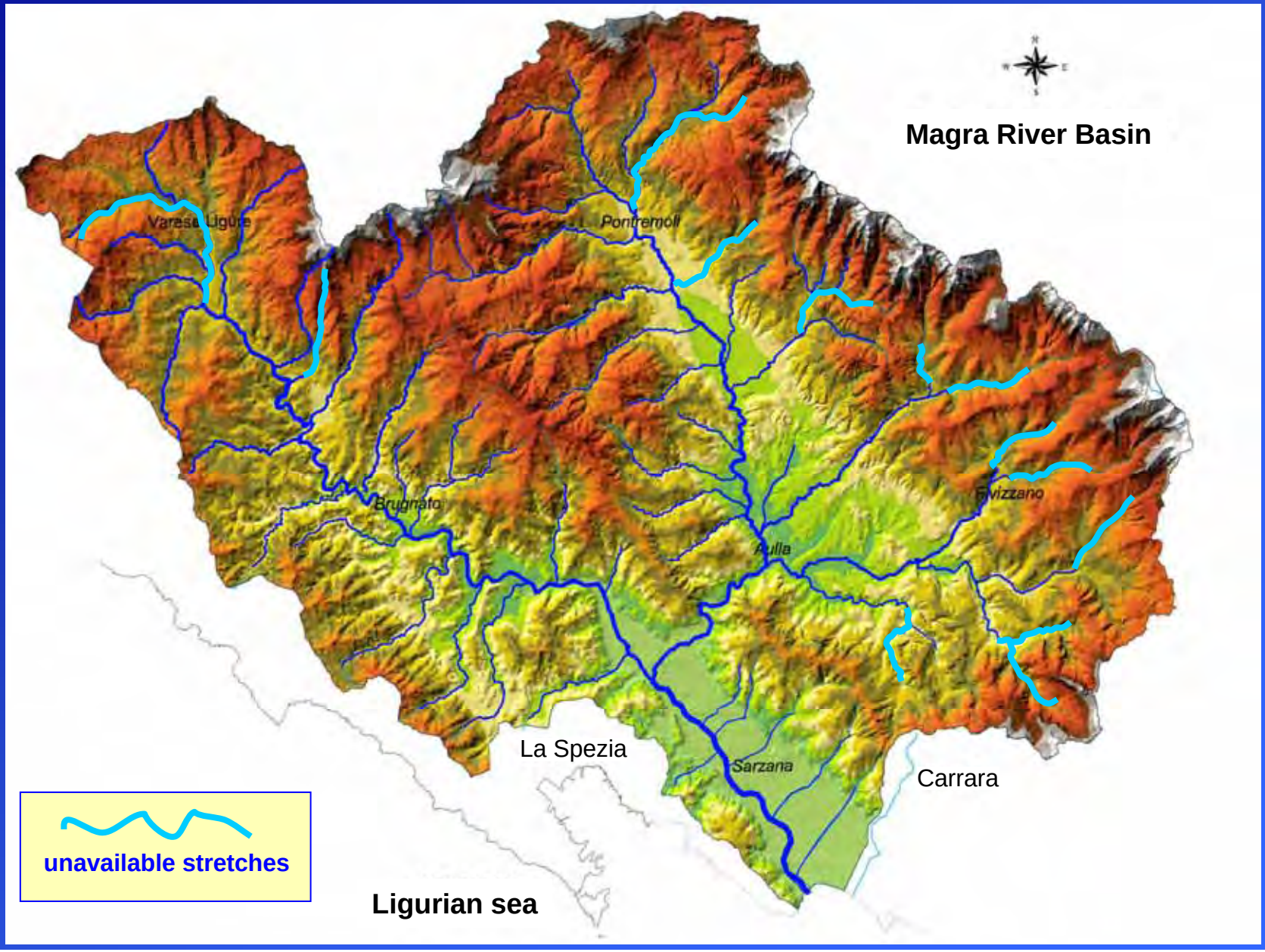
High DMV (instream minimum flow requirements)

$$DMV = Sup. \cdot R_{sp.} \cdot P \cdot A \cdot N \cdot Q_B \cdot Q_R \cdot G \cdot L_{7,5} + M_{10}$$

penalizations in high natural environments and for very long derivations

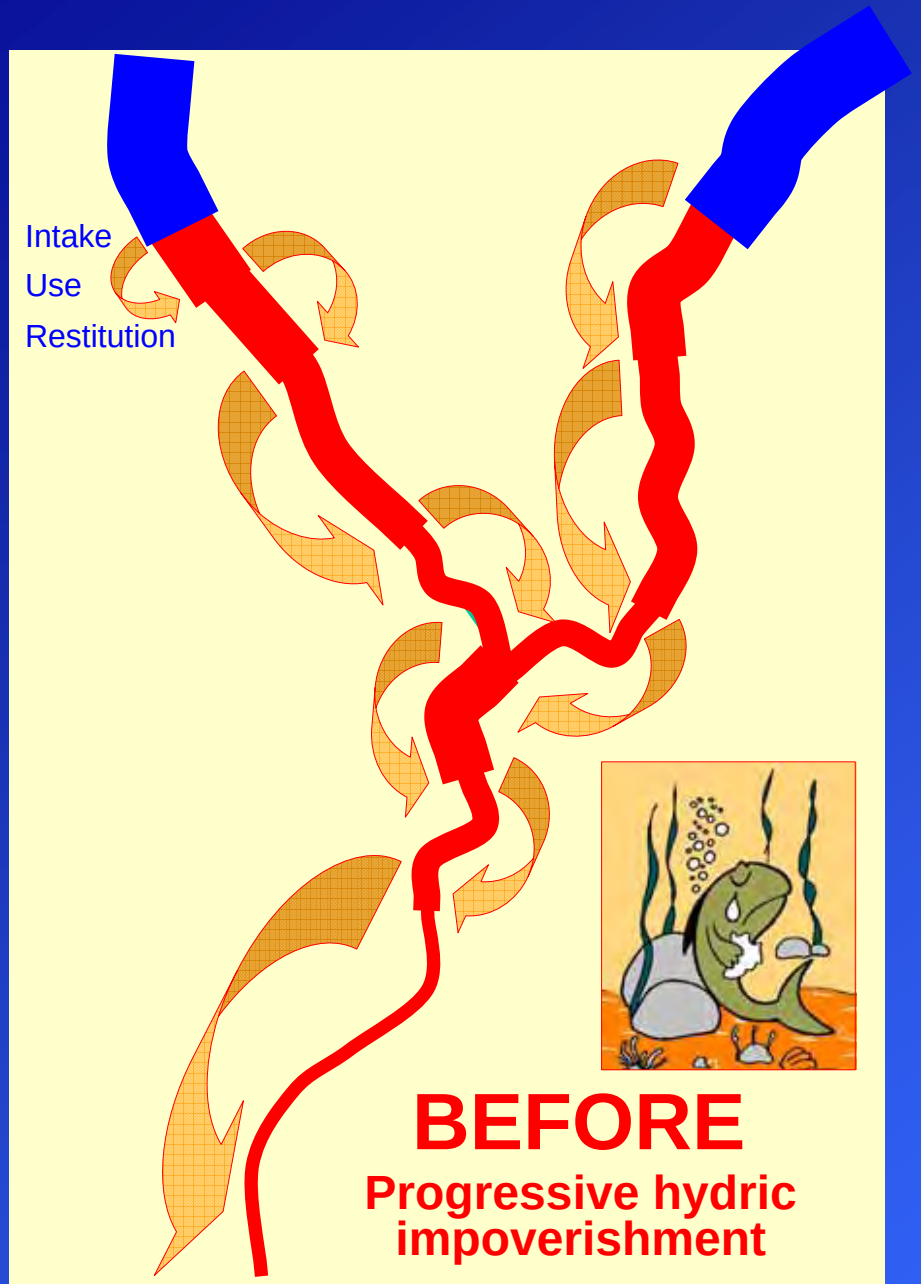


Not only DMV:
Stretches unavailable for derivations



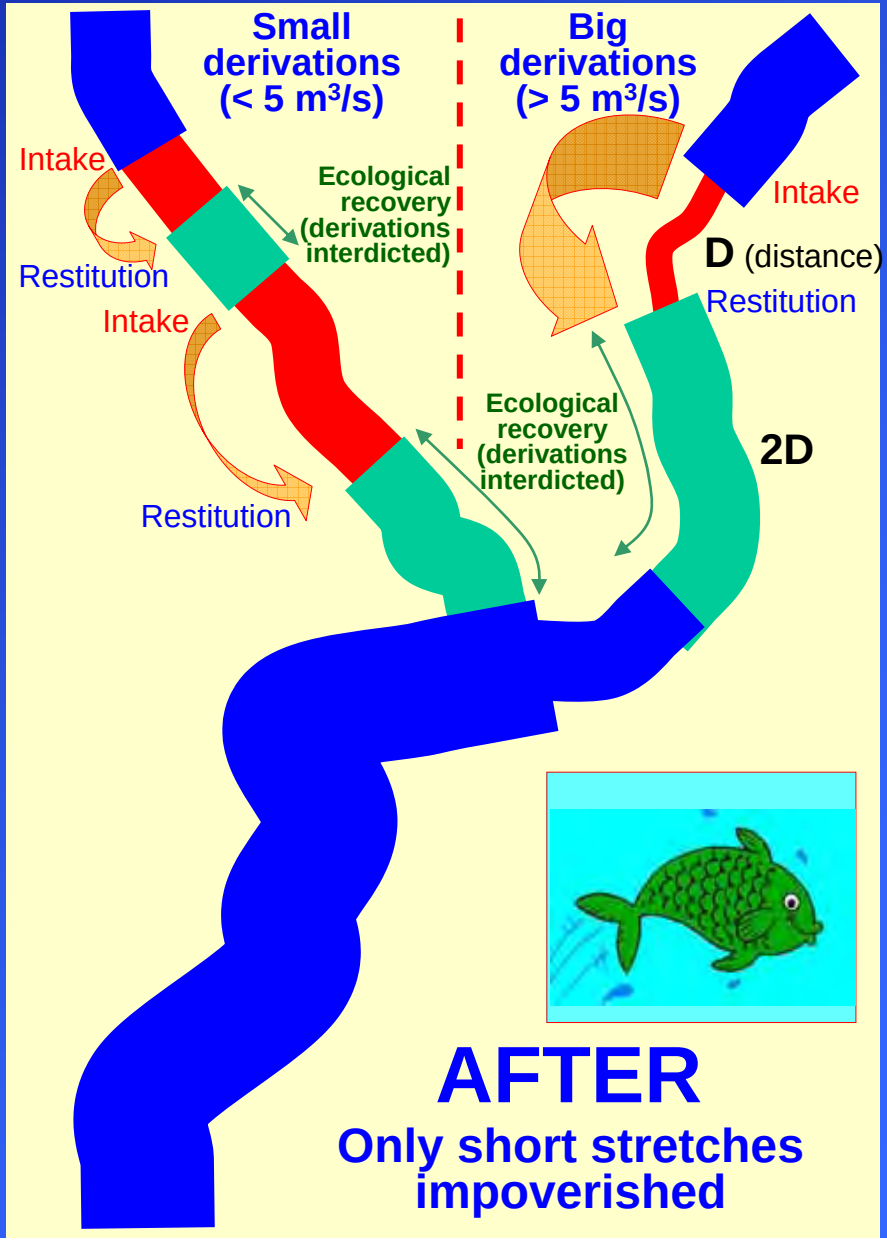
Not only DMV: Restrictions on derivations density

(sequences of derivations interdicted)



BEFORE

Progressive hydric impoverishment



AFTER

Only short stretches impoverished

Not only DMV: Fishpasses

Not only DMV: ❑ Discharge gauges

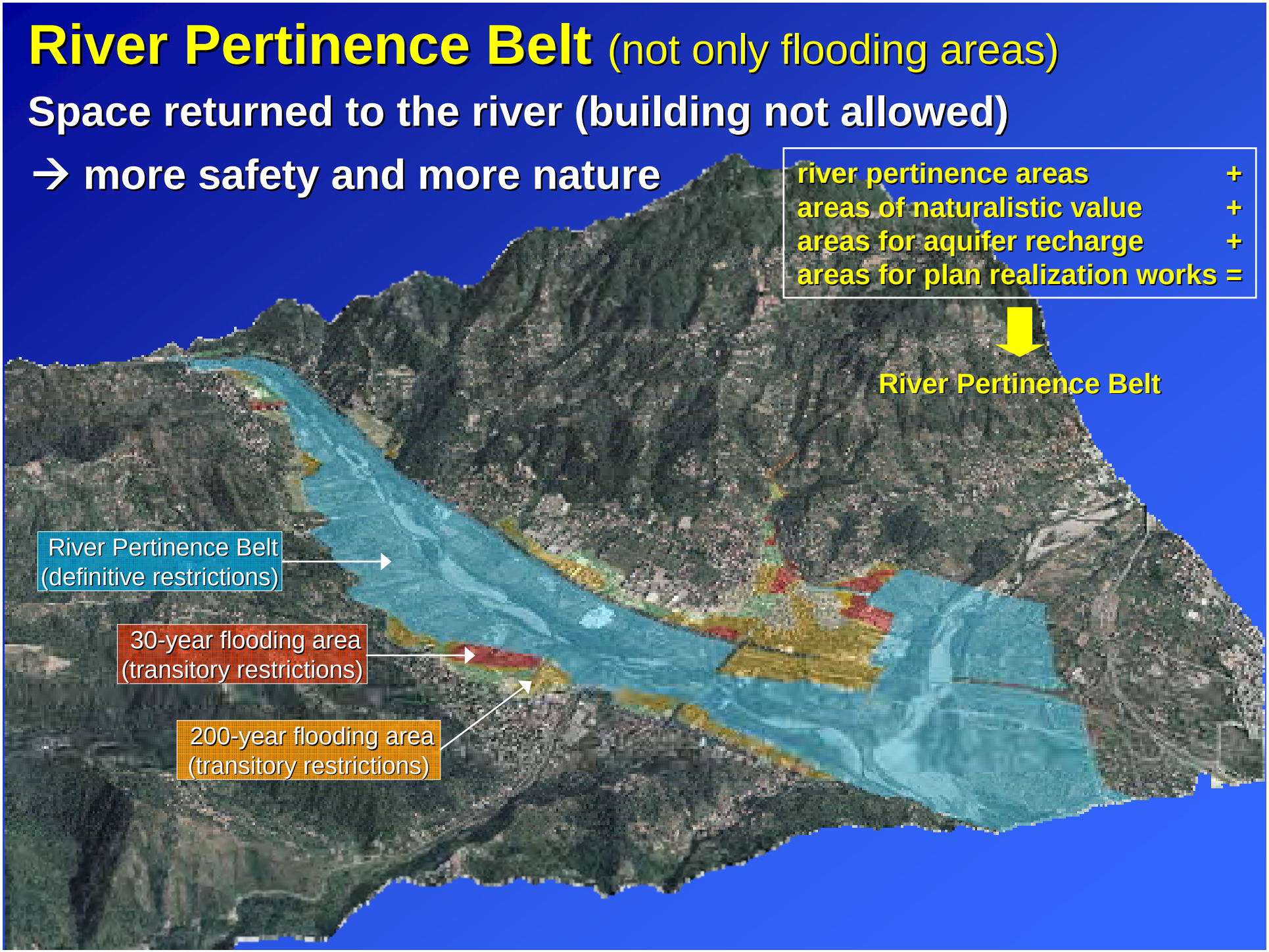
(on view of public)

❑ etc., etc.

River Pertinence Belt (not only flooding areas)

Space returned to the river (building not allowed)

→ more safety and more nature



Directions for environmental design of fluvial works

Work with nature!

Autorità di Bacino interregionale del Fiume Magra

INDICAZIONI PER LA PROGETTAZIONE AMBIENTALE DEI LAVORI FLUVIALI

Piano Assetto Idrogeologico

Allegato 3

Giugno 2001

antierosiva, inducono la formazione di barre falciformi sulle sponde e di buche e barre in alveo (Fig. 14 e 15).

Una protezione efficace che fornisce habitat particolarmente idonei all'ittiofauna è il rivestimento con alberi saldamente ancorati alle sponde con cavi d'acciaio; anche questo accorgimento, generando complesse turbolenze locali, migliora la diversità ambientale sia sulle sponde che in pieno alveo (Fig. 16).

Analoghi risultati possono ottenersi rivestendo la sponda con tronchi muniti dell'apparato radicale, consolidati al piede con massi profondamente immorsati nelle sponde (Fig. 17).

Fig. 14. A differenza delle tradizionali difese spondali longitudinali, i pennelli deflettori inducono la formazione di habitat differenziati nelle sponde e in pieno alveo.

Fig. 15. Pennello mobile in massi legati con cavi d'acciaio.

Fig. 16. Una serie di alberi collegati, ancorati alla sponda o a galleggianti, riduce la velocità di corrente presso la sponda e intrappola sediment, favorendo l'insediamento di vegetazione che fornisce un'ulteriore protezione.

Cap. 3

CRITERI PER INTERVENTI SU FOSSI E CANALI

3.1 Introduzione

I fossi, nonostante l'origine artificiale di molti di essi, ospitano una ricca comunità animale e vegetale, particolarmente preziosa se si considera che le nostre pianure costiere sono state drammaticamente impoverite dal punto di vista naturalistico a seguito delle grandi opere di bonifica e che buona parte delle specie tipiche delle zone umide è stata costretta a rifugiarsi nei pochi habitat relitti e nei fossi. È dunque necessario adottare metodi costruttivi e manutentivi che ne rispettino o ne ripristinino il valore naturalistico.

Troppo spesso, per la mancata consapevolezza di questo valore, la manutenzione dei fossi mira unicamente a garantire un buon drenaggio: l'impatto ambientale connesso all'alveo uniforme e all'uso di mezzi meccanici viene perpetuato dai lavori di manutenzione; ogni asperità, ogni piccola curva vengono eliminate; i fossi vengono "tenuti al loro posto"; si lavora "contro di essi" anziché "con essi"; le sponde, non consolidate dalla vegetazione, diventano facilmente erodibili; la qualità delle acque e la qualità biologica dei fossi diventano scadenti.

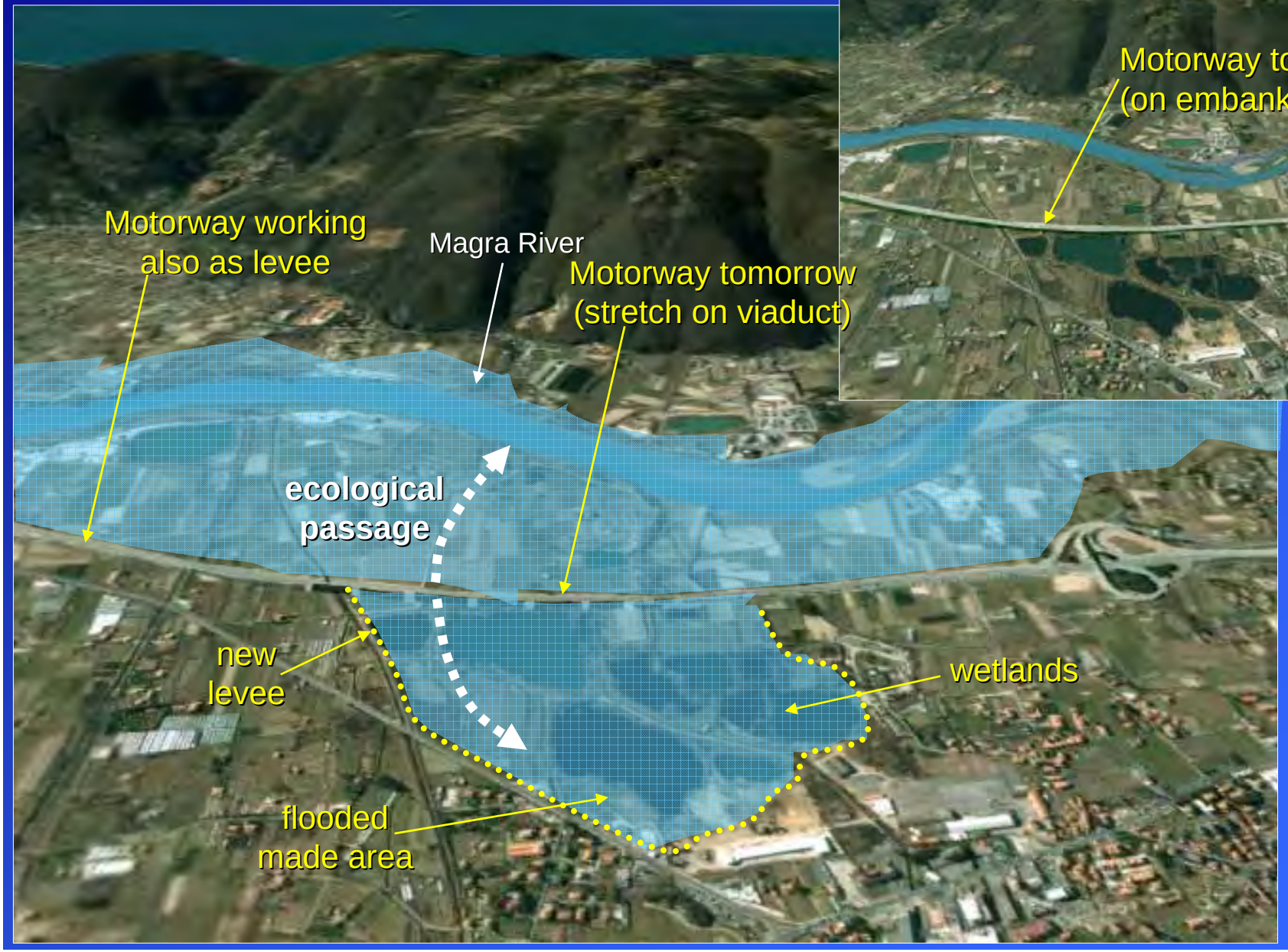
In altri paesi europei sono state elaborate direttive e normative specifiche e avviate iniziative per una gestione "rispettosa" dei fossi, ruscelli, canali e, più in generale, dei piccoli corsi d'acqua. Per la stesura delle presenti indicazioni si è largamente attinto da esse, in particolare da quelle danesi (Ministero dell'Ambiente e dell'Energia) e inglesi (Consiglio per la Conservazione della Natura e Associazione dei Consorzi di bonifica).

In sintesi, i nuovi orientamenti prevedono: l'abbandono dei dragaggi; uno sfalcio della vegetazione rispettoso, che conservi al contempo il potere autodepurante, i rifugi per pesci, gli habitat per gli insetti; la conservazione delle bordure vegetali sulle rive (in quanto proteggono le sponde dall'erosione senza rappresentare un reale ostacolo al drenaggio); il letto non deve essere uniforme e limoso, ma diversificato (con limo, sabbia, ghiaia, ciottoli); il percorso non deve essere rettilineo, ma sinuoso; la profondità deve essere discreta e variare lungo il percorso; l'aspetto di un fosso ben tenuto, insomma, non è più quello "liscio e ben ordinato", ma piuttosto quello "trasandato" dei ruscelli naturali (fig. 25).

Fig. 25. L'obiettivo di una corretta manutenzione dei fossi è di conferire loro un aspetto "trasandato".

“Educative” (mandatory) advices

Third lane of motorway: Mitigation? No, improvement!



Bank protection or sediment equilibrium?

- **hydraulic works costs higher than land value**
- **Bank erosion is useful for sediment redress**

Functional Mobility Belt (freedom for rivers)

> nature

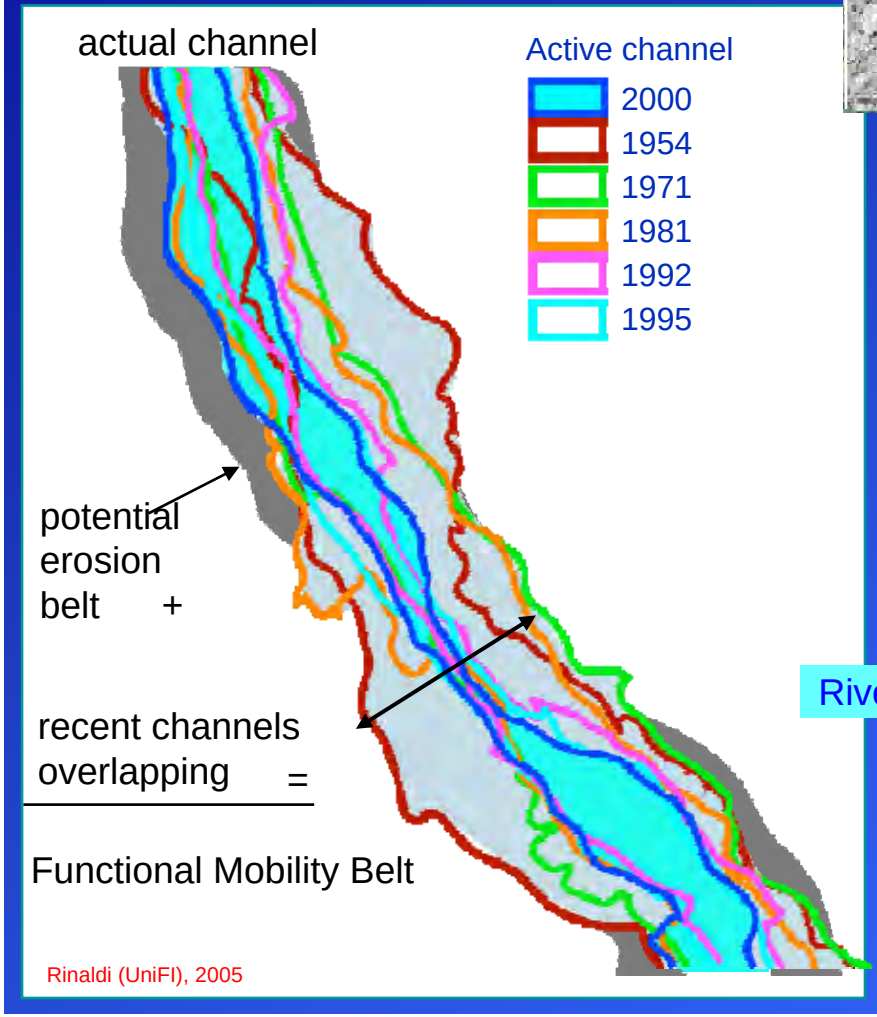
< works

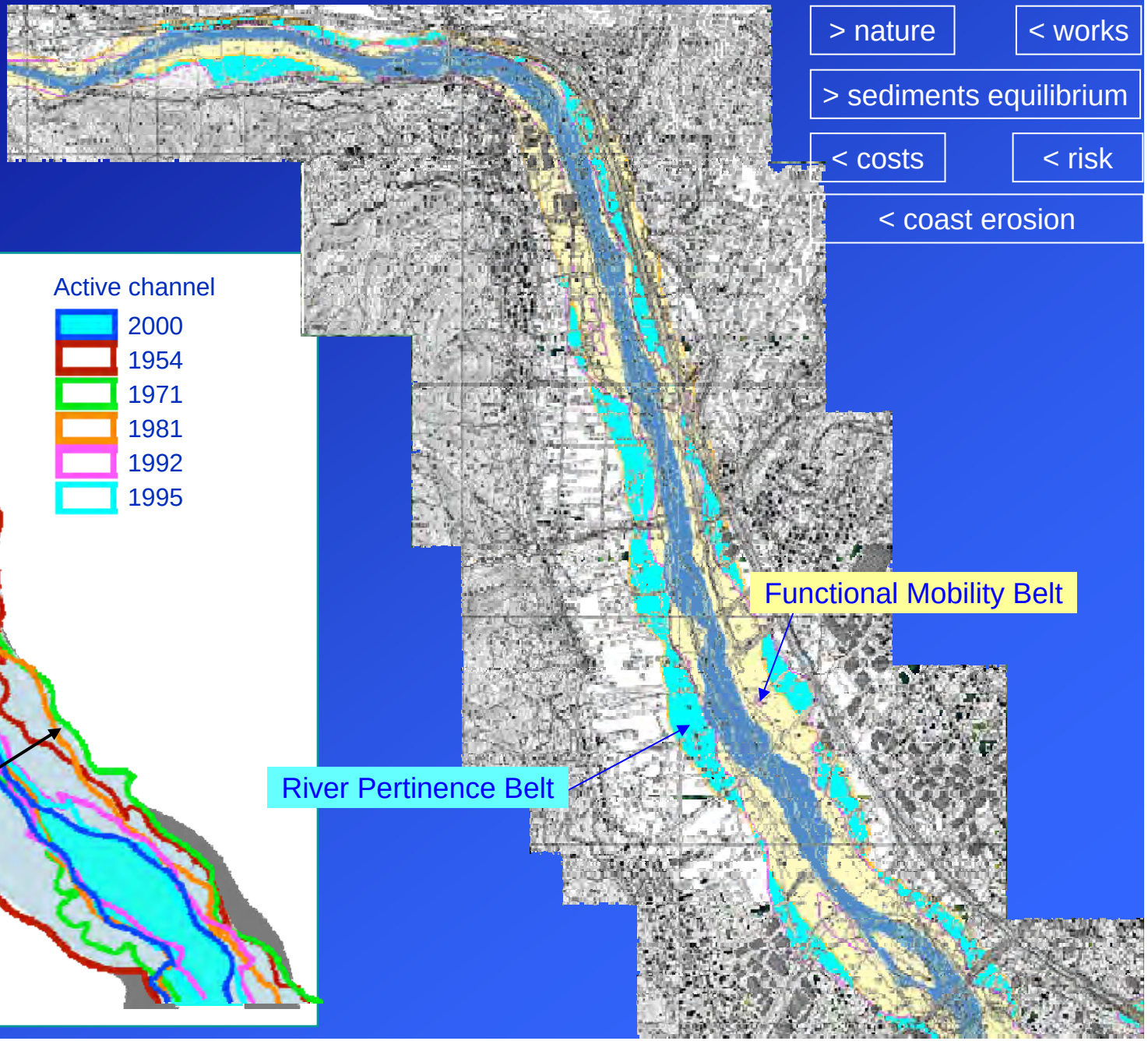
> sediments equilibrium

< costs

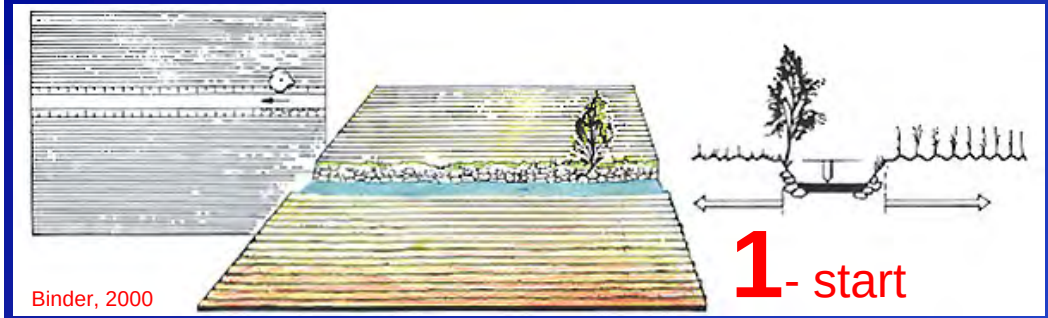
< risk

< coast erosion

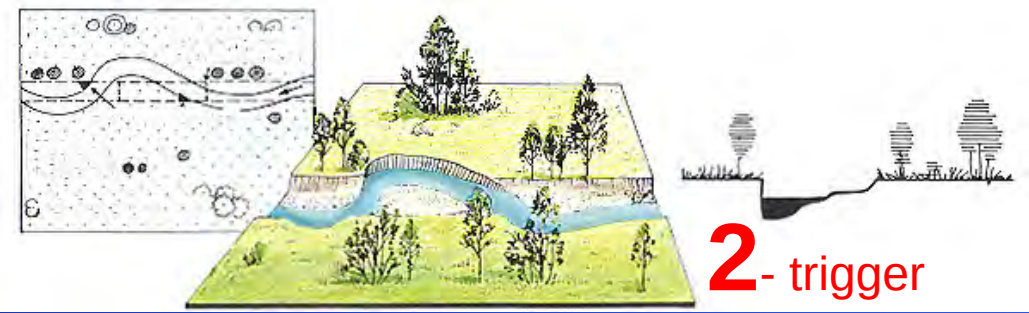




Fluvial Mobility Belt → spontaneous restoration



Bank revetments and rectified channel



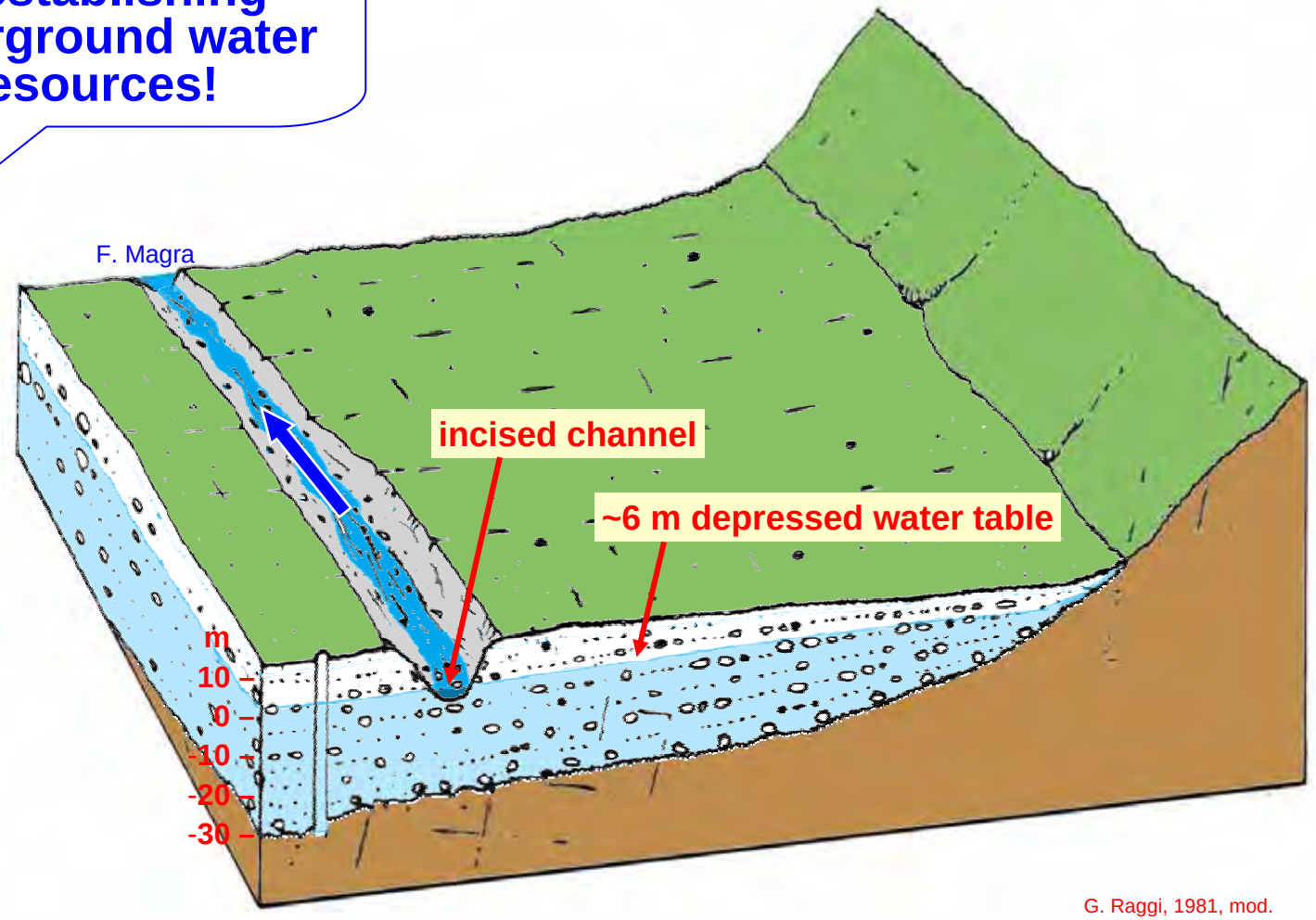
Bank revetmets remotion
→ sinuosity recovery, floodplain growing
→ vegetation taking root

Channel morphology, edaphic conditions and vegetation growth controlled by well developed floodplain

Equilibrium achieved, fluvial processes and habitat restored

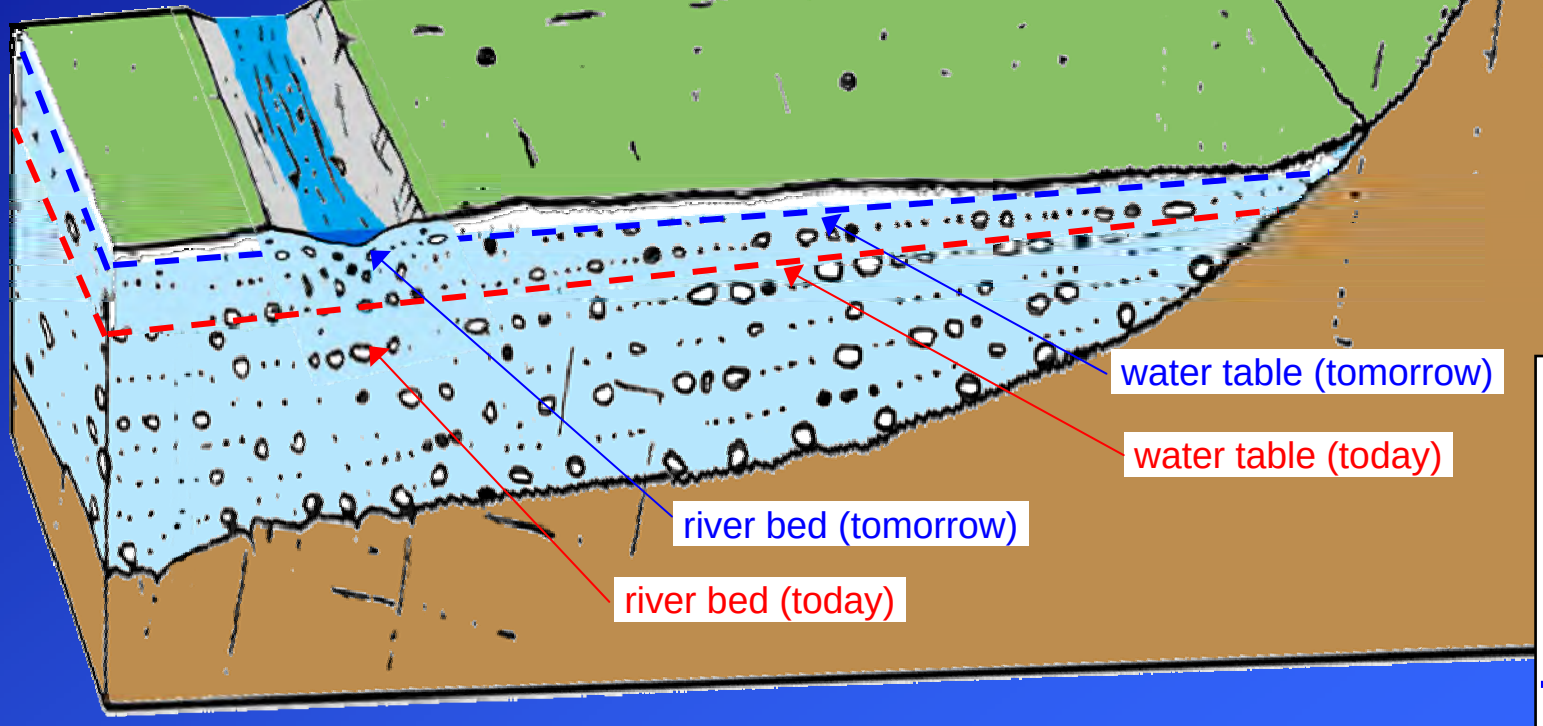
Water crisis: looking on future

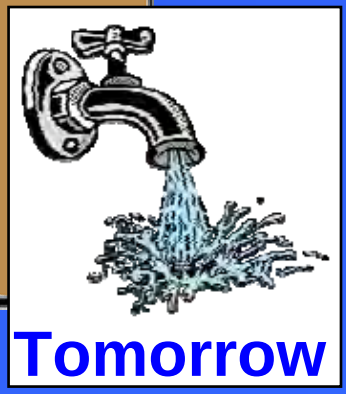
raising water table; re-establishing underground water resources!



G. Raggi, 1981, mod.

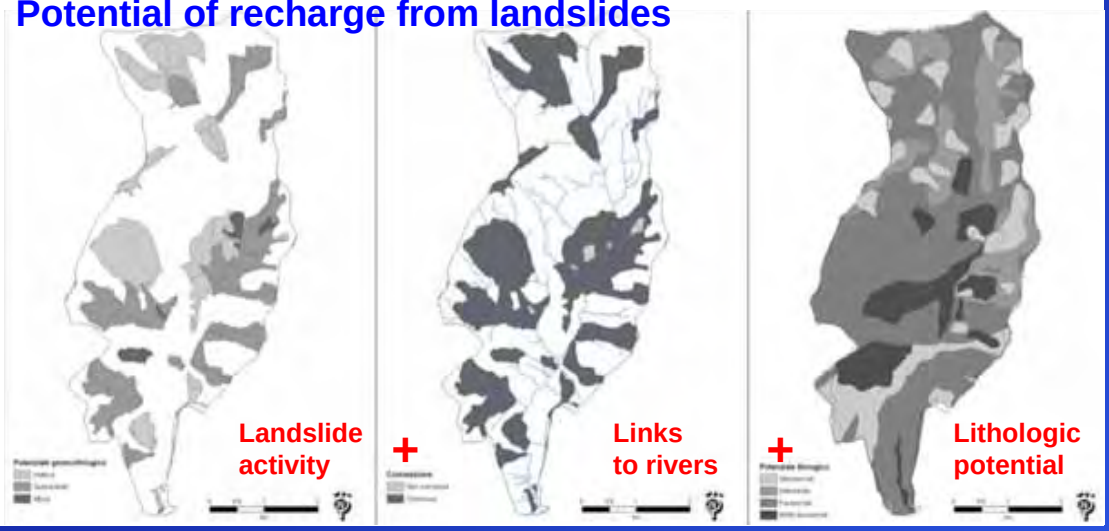
River bed aggradation
→ water table raising
→ less water crisis

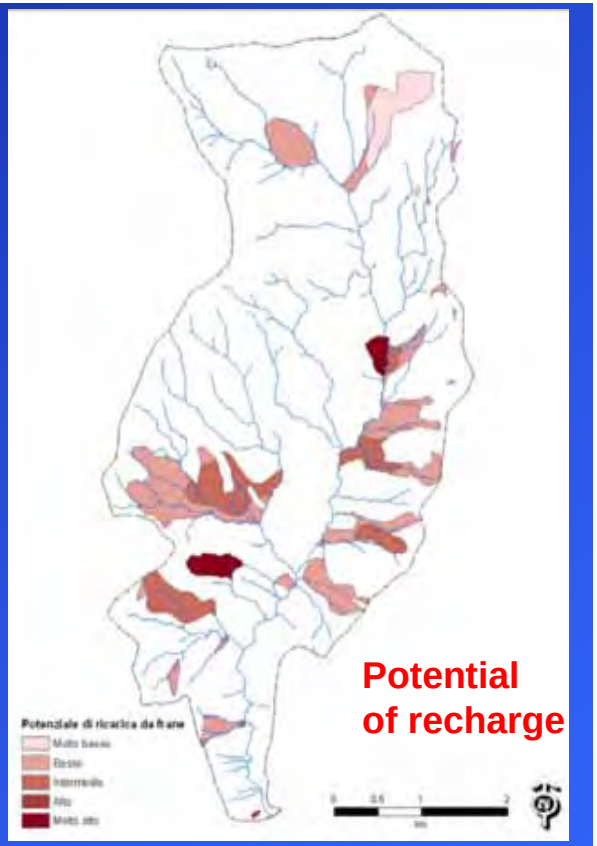


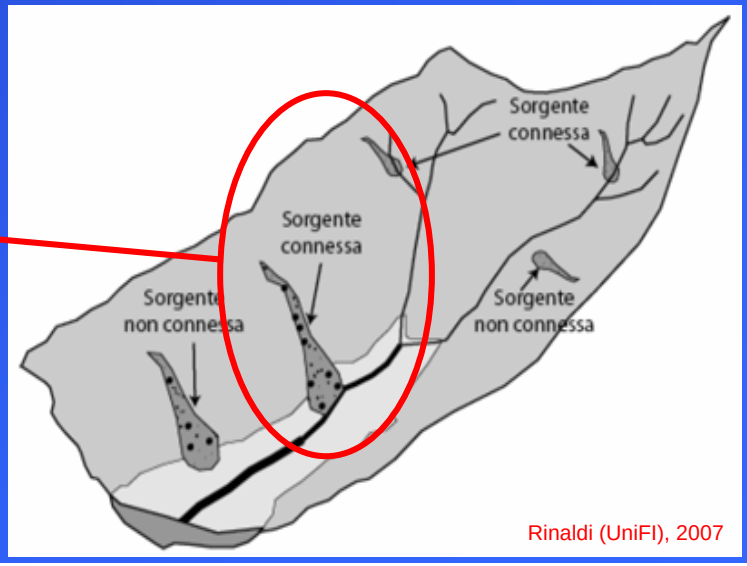


Channel sediments feeding (from landslides)

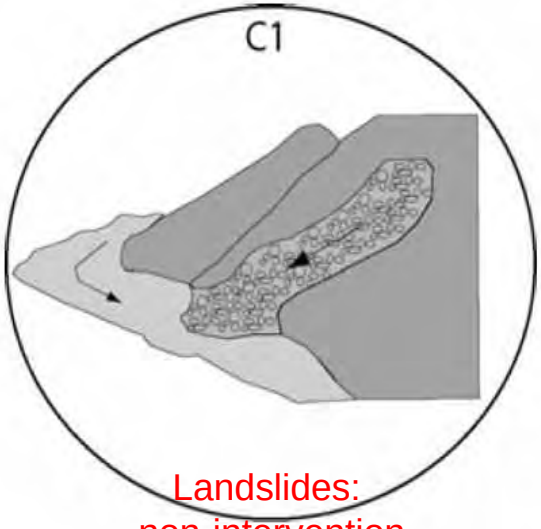
Potential of recharge from landslides



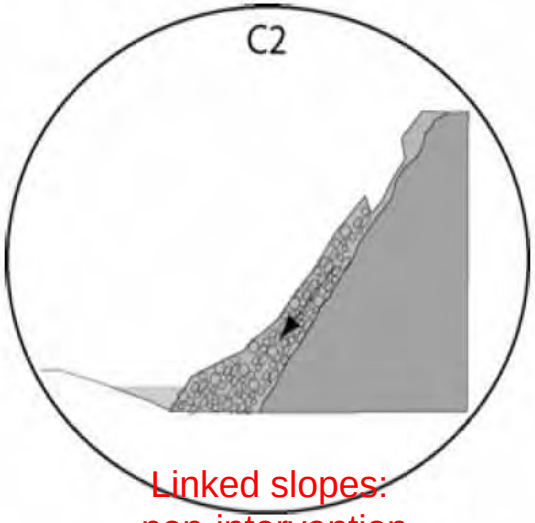




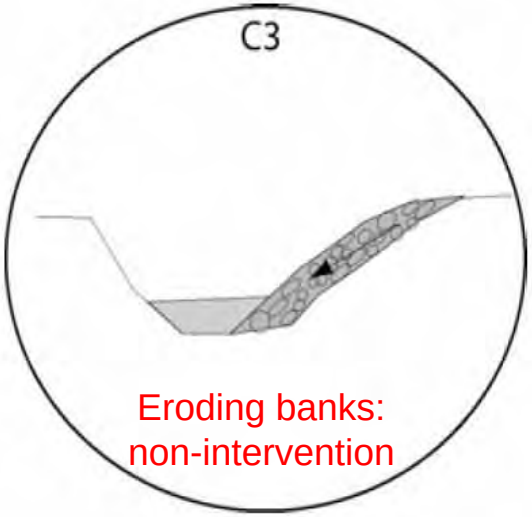
Channel sediments feeding: conservative measures



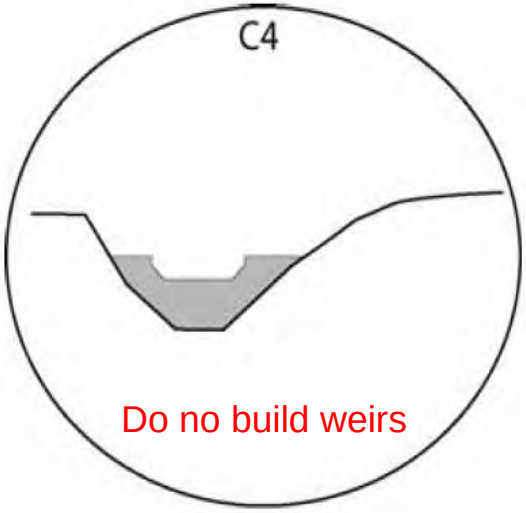
Landslides:
non-intervention



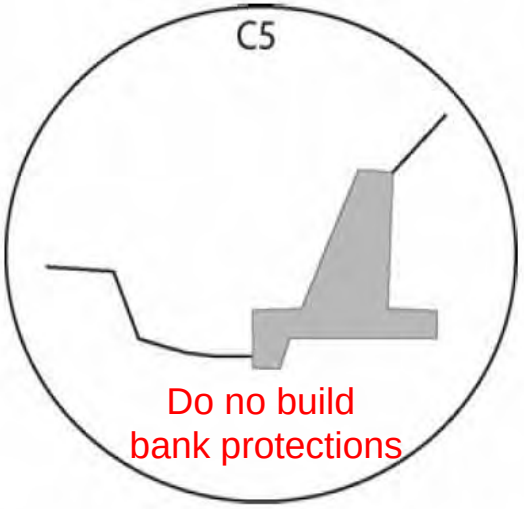
Linked slopes:
non-intervention



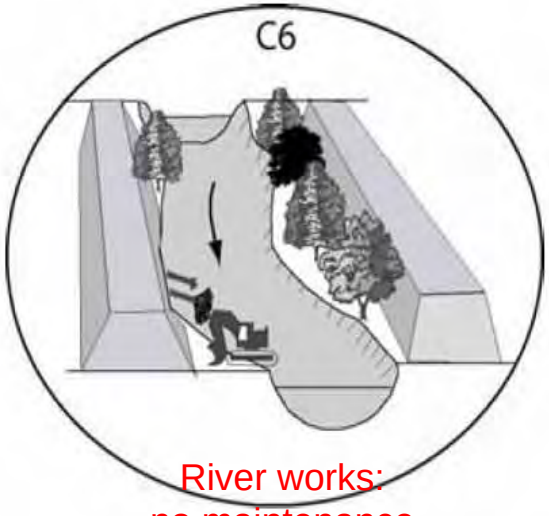
Eroding banks:
non-intervention



Do no build weirs



Do no build
bank protections

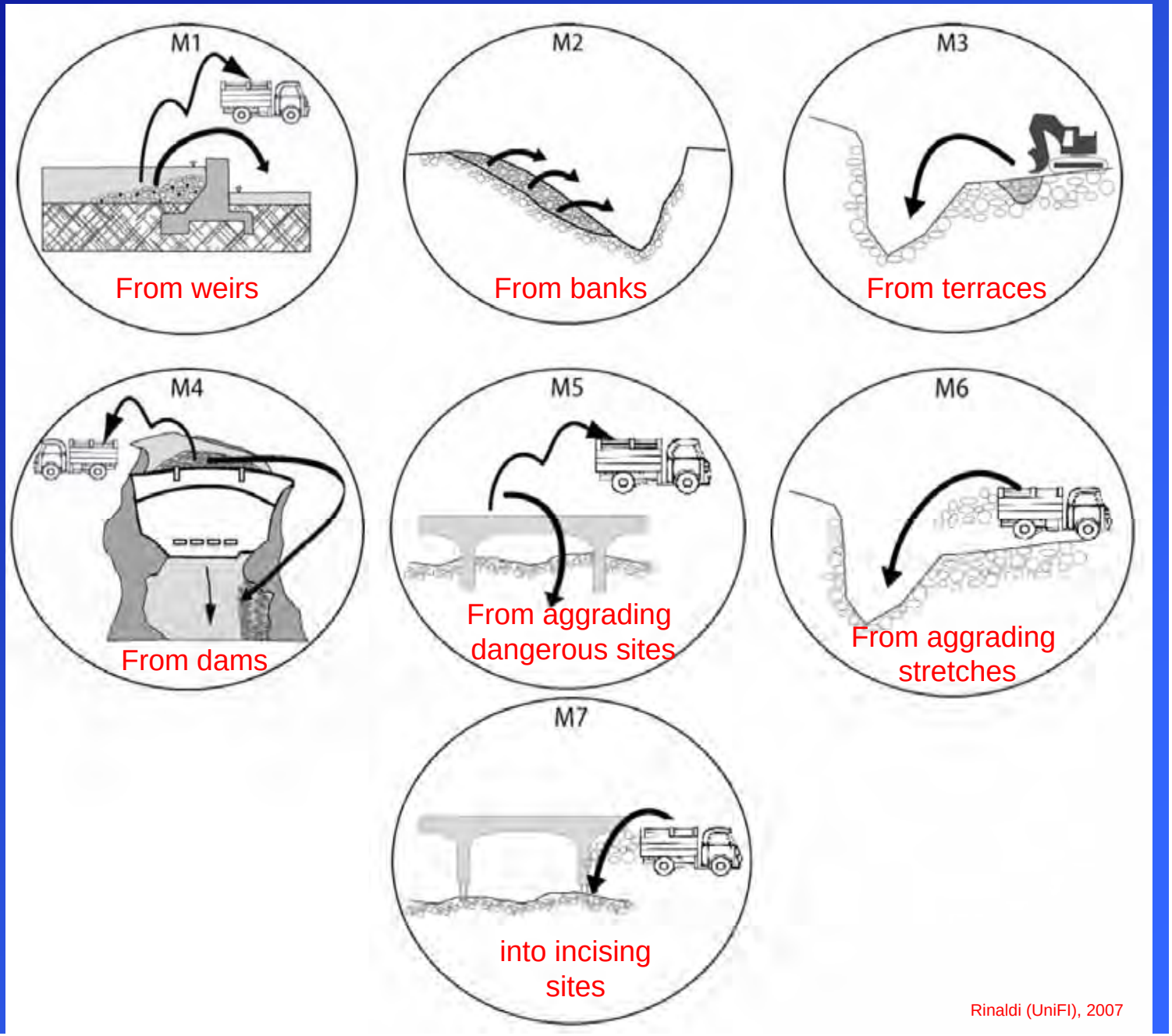


River works:
no maintenance

Rinaldi (UniFI), 2007

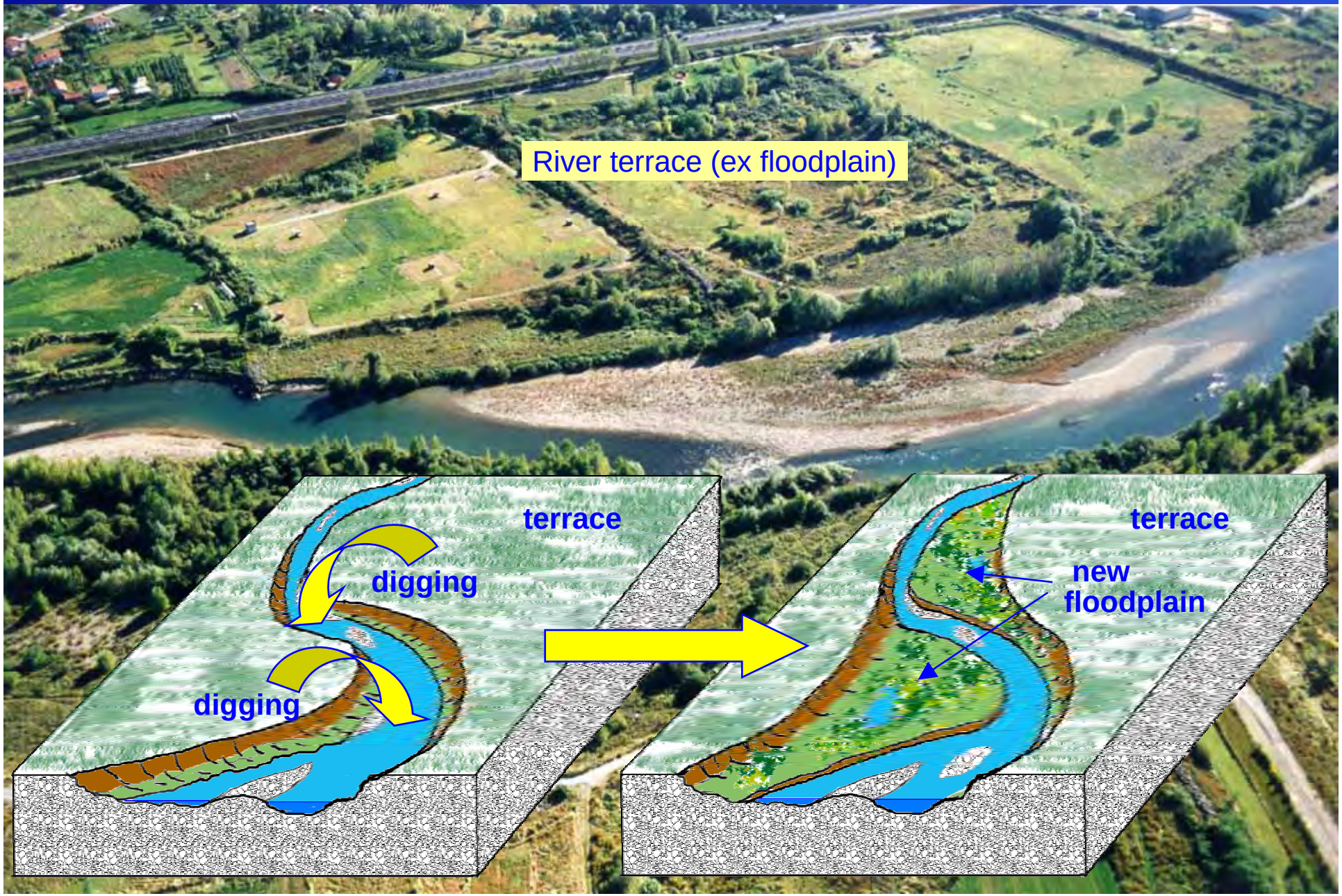
Channel sediments feeding: remedial measures

Sediments mobilization and transfer



Rinaldi (UniFI), 2007

Channel sediments feeding (from terraces)



Magra River Basin Authority