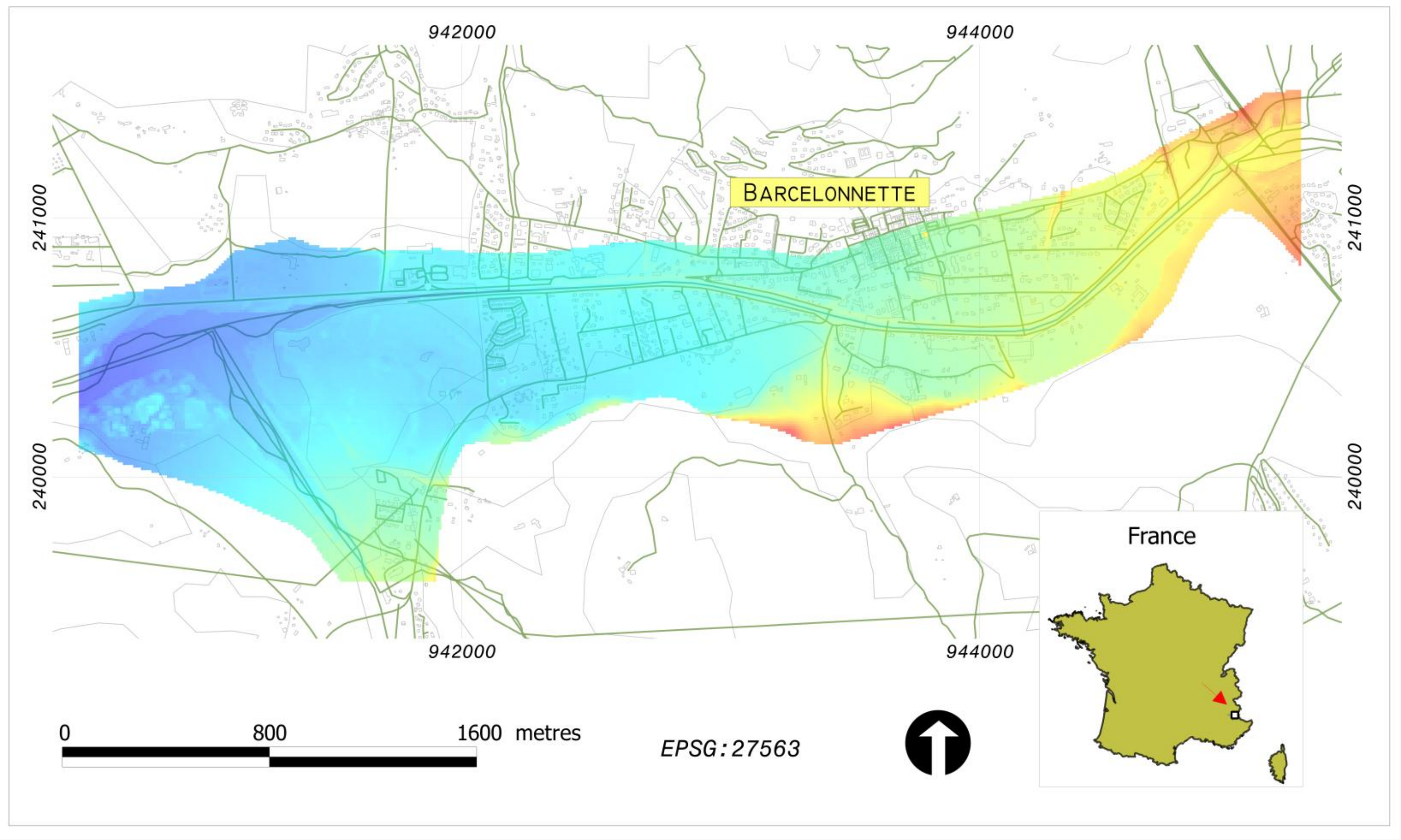
KULTURISK METHODOLOGY IMPLEMENTATION:

UBAYE VALLEY (BARCELONNETTE TOWN)

KULTURisk ; UNESCO-IHE

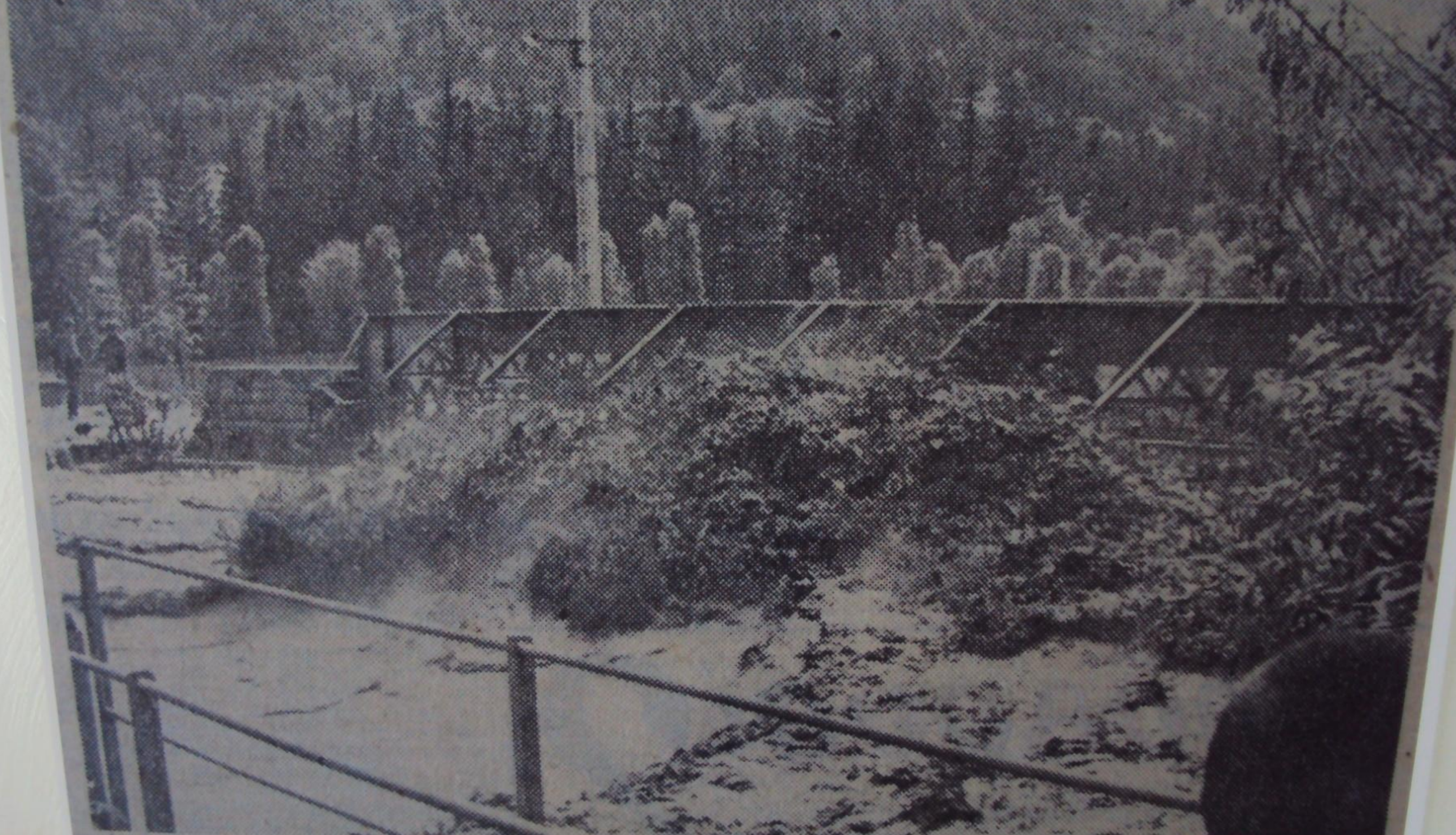
Study area

Ubaye Valley (Barcelonnette Town)



Nice Matin du 16/06/1957

Ubaye - Juin 1957
(Pont de l'Abattoir)



A Barcelonnette, le pont de l'Abattoir est furieusement attaqué par l'Ubaye, dont les eaux sont

COMMUNE DE BARCELONNETTE

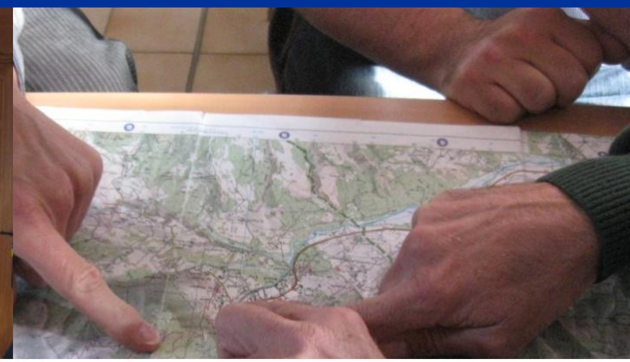
CRUE DE L'UBAYE
JUIN 1957

30 m3/s derecha

Hydraulic flood inundation model

- Lisflood-FP (Neal et al., 2012) was used in the determination of the flood inundation characteristics
- Taking into account the bridges, embankments and the floodplain topography
- Topographic information was derived from LiDAR data and field survey cross-sections

Stakeholder Interaction



LES VALLÉES 11

BARCELONNETTE

L'Ubaye auscultée par des chercheurs

Qui sont-ils ?

SAINT-ANDRÉ-LES-ALPES

ANNOT

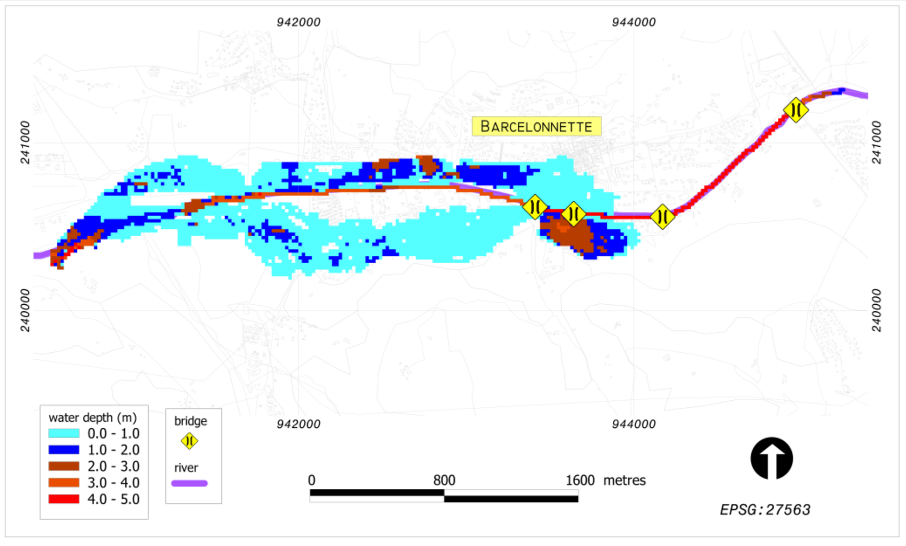
Case study scenarios

- Baseline
  - Current state of the river geometry and structures
- Scenario 1
  - River channel conveyance enhanced by bridge reconstruction
- Scenario 2
  - Inclusion of the benefits of a formal reliable Early Warning System to the baseline
- Scenario 3 (1 + 2)
  - Combined measures of a formal Early warning system and improving the channel conveyance

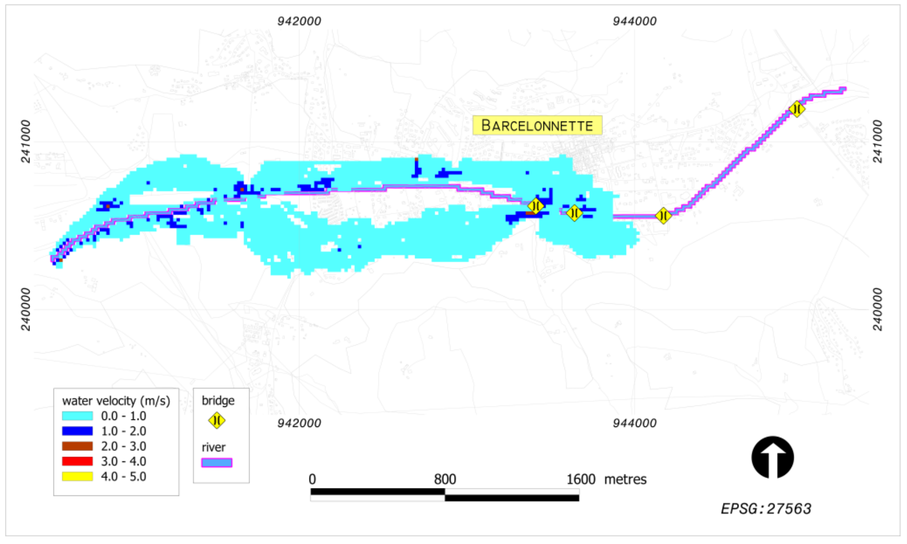
REGIONAL RISK ASSESSEMENT

(RRA)

RRA: Flood hazard: Baseline

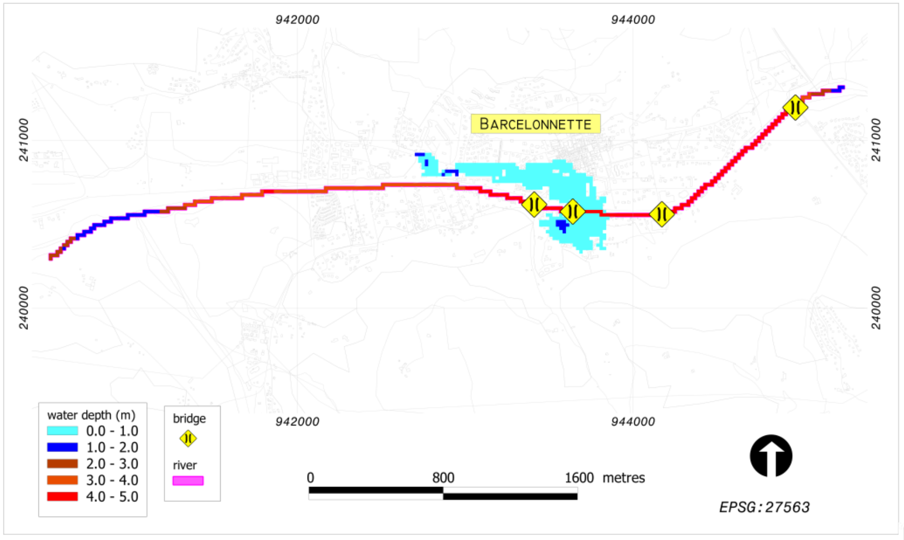


Water depth (m)

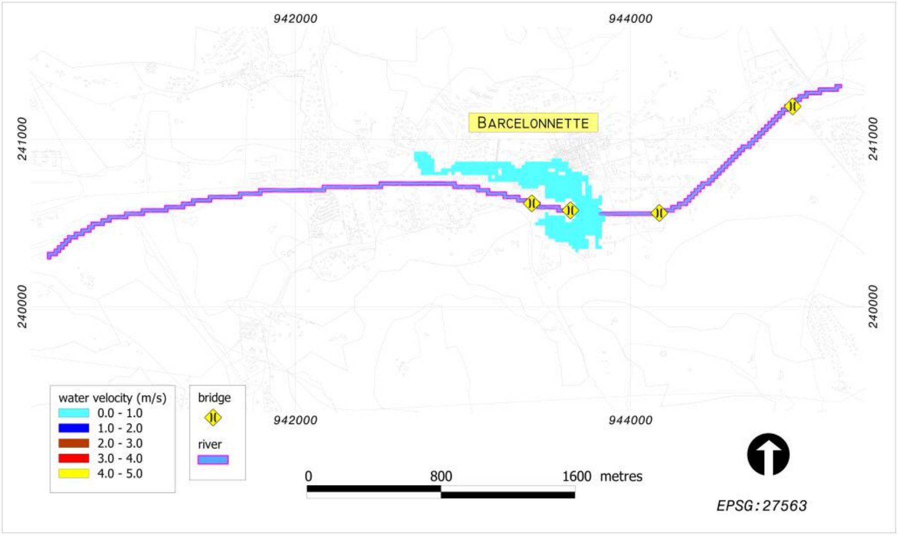


Velocity (m/s)

RRA(Flood hazard) Improved bridge



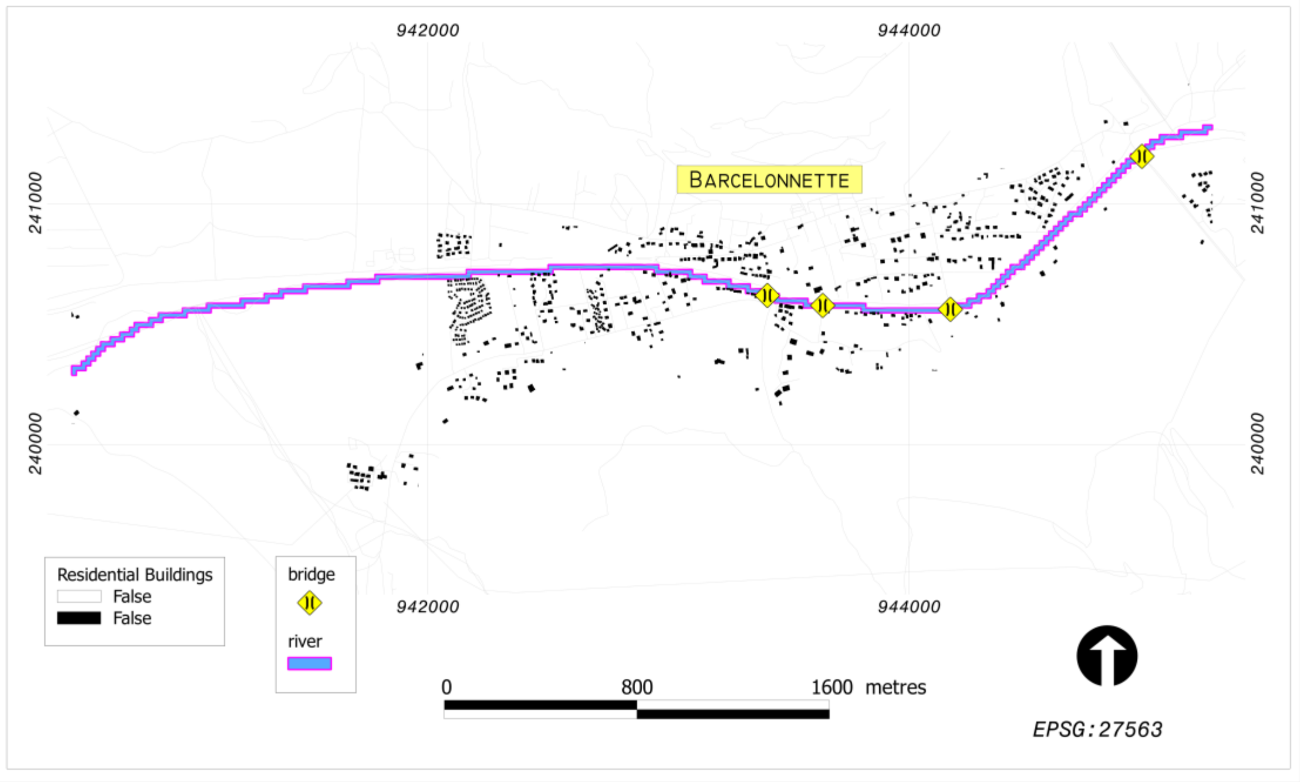
Water depth (m)



Velocity (m^3/s)

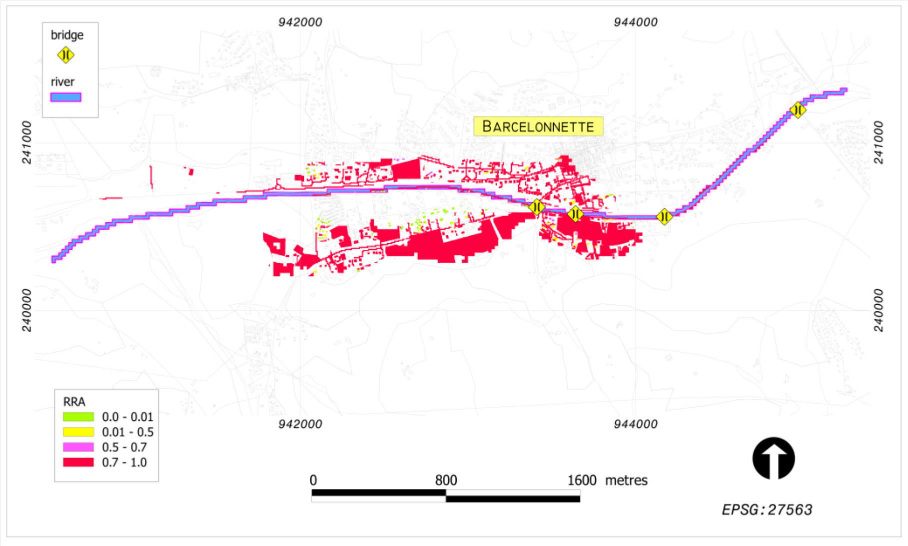
RRA – Exposure of People

The exposure of people is based on the average number of people per household; distributed over the area covered by the residential housing units

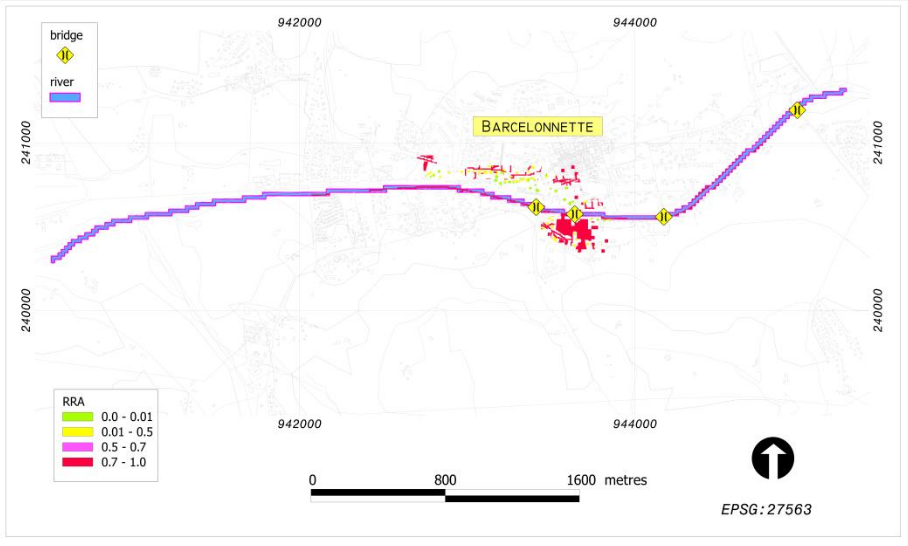


RRA *superimposed* map

Baseline



Scenario 1



- The improvement of the bridge clearance results in the greatest reduction in risk due to a reduction in the hazard extent

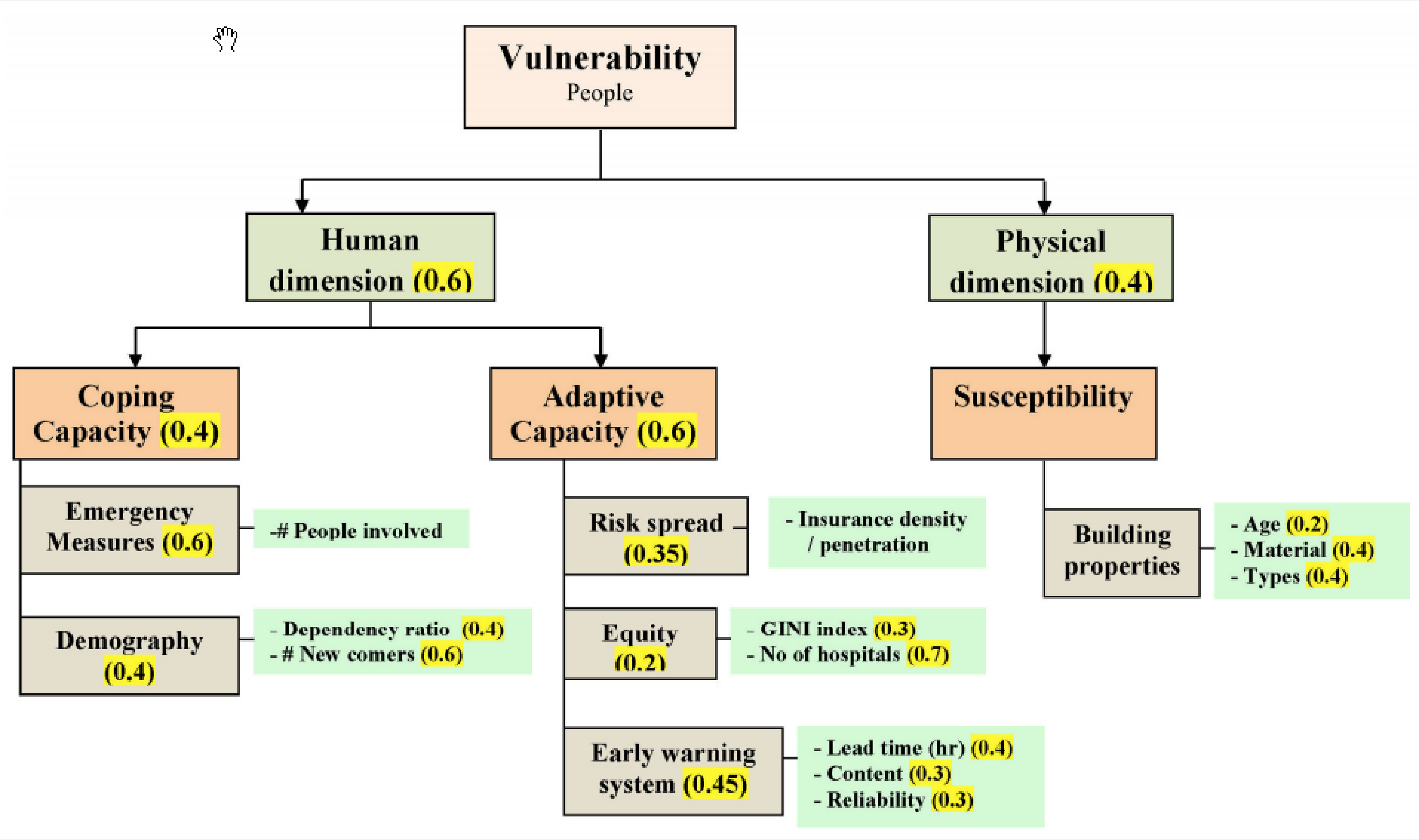
RRA – Affected percentages

Receptor	Damage level	Baseline & Scenario 2 (%)	Scenario 1 & Scenario 3 (%)
Buildings	Inundation	31.83	6.04
	Partial damage	0.00	0.00
	destruction	0.00	0.00
Roads	Inundated	20.11	6.45
Agriculture	Inundation	10.32	1.08
	destruction	7.40	0.73

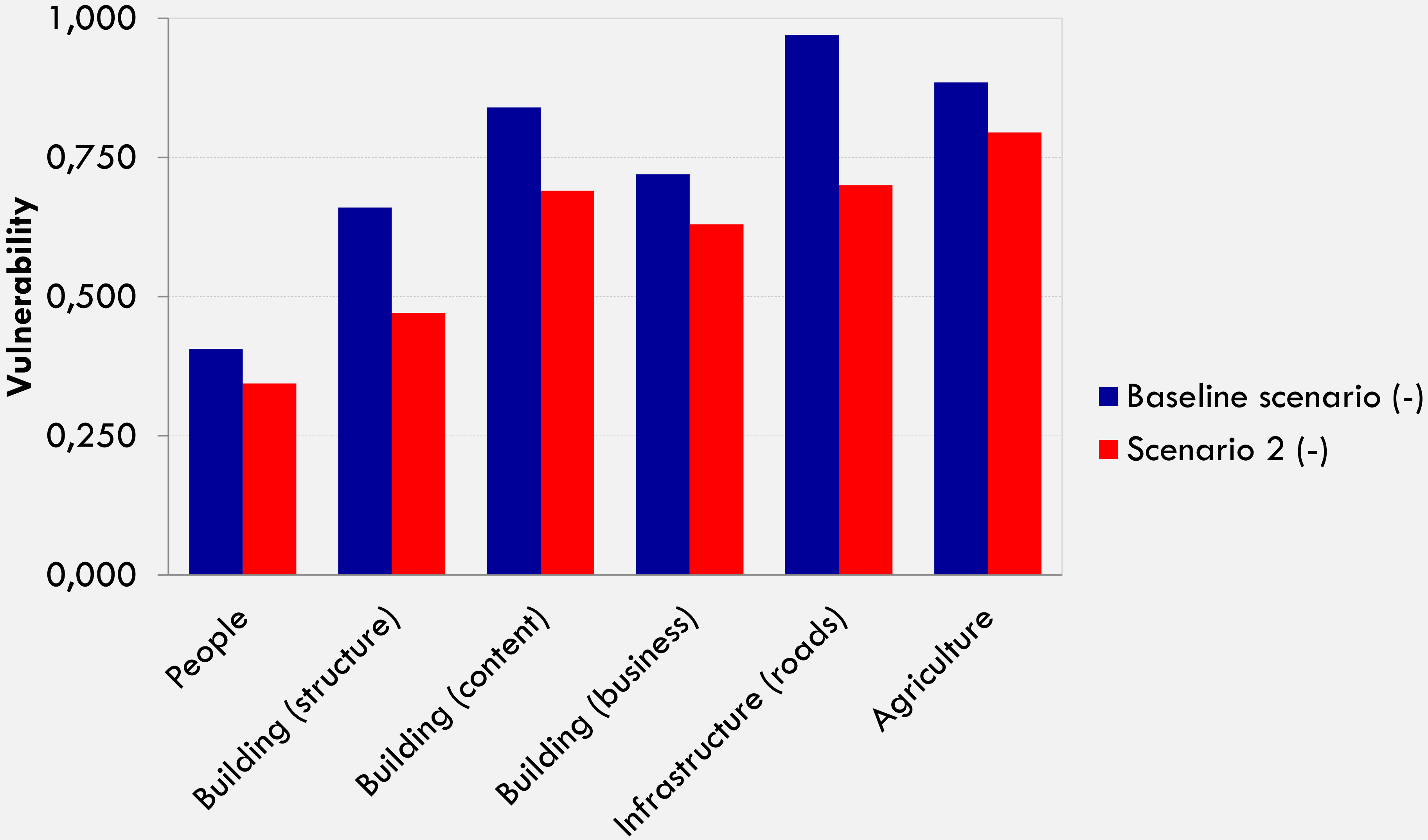
SOCIAL – REGIONAL RISK ASSESSEMENT

(S-RRA)

S-RRA: E.g. Hierachical combination



Effect of the EWS on vulnerability

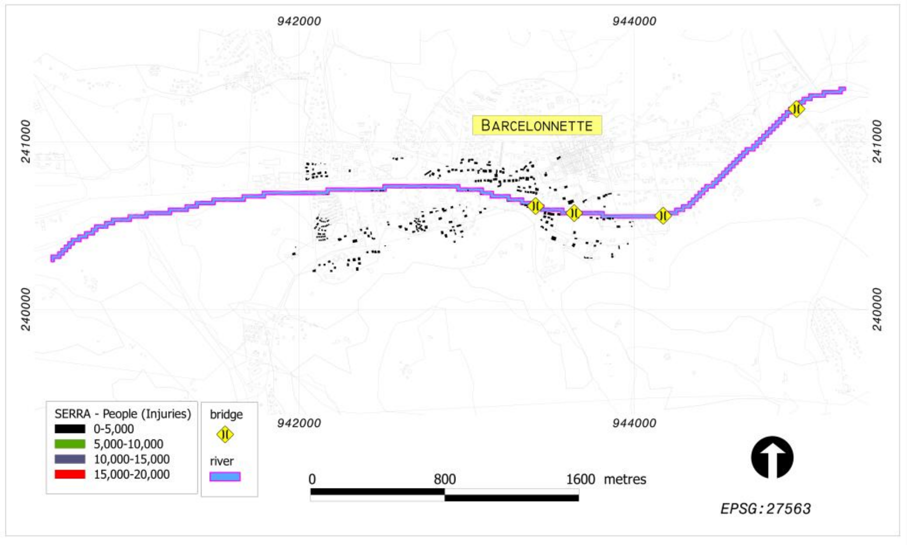


ECONOMIC– REGIONAL RISK ASSESSEMENT

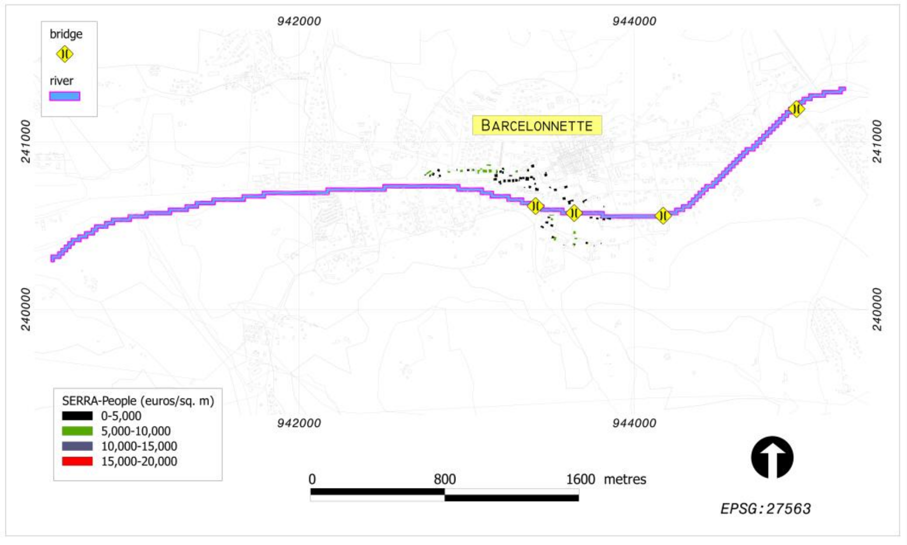
(E-RRA)

Cost of potential injuries

$$C_{pi} = E \times R_1 \times B_1 \times VSL$$



Baseline

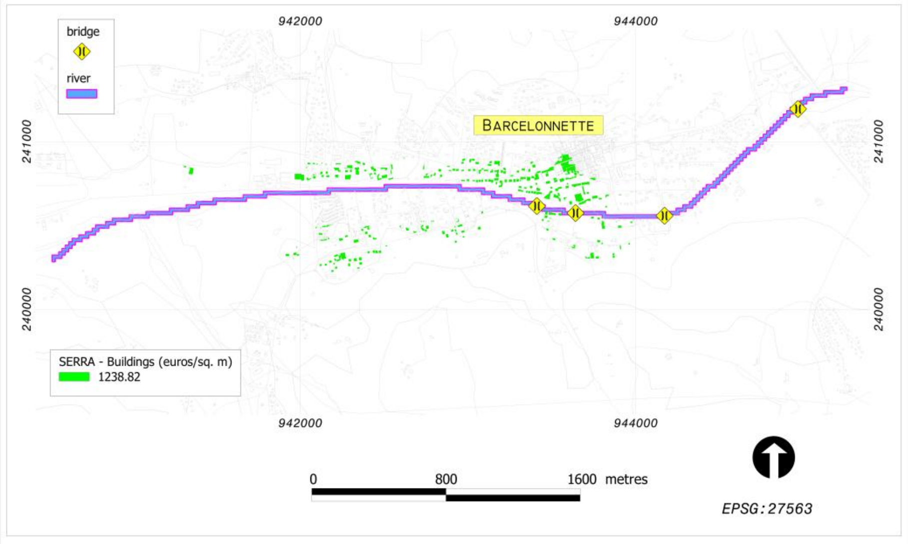


Scenario 1

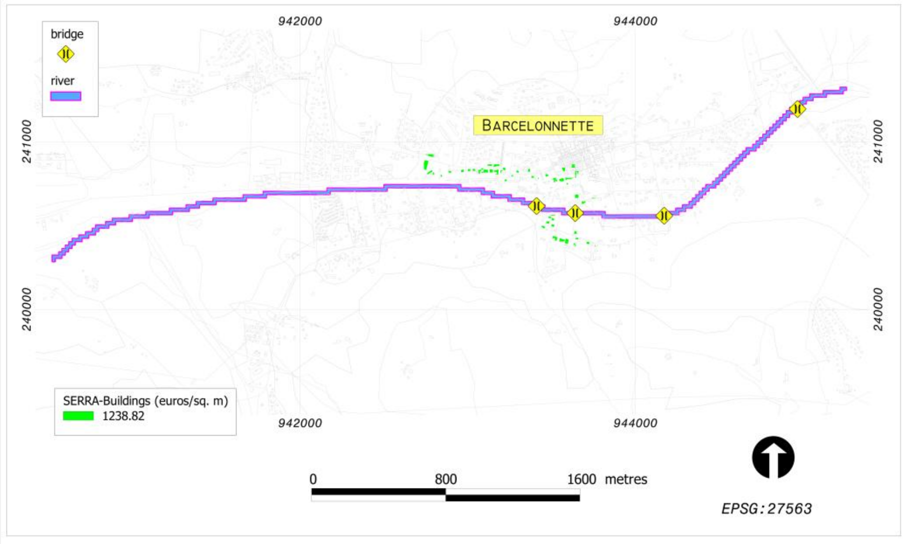
Damage to buildings

$$D_{sr} = P \times \sum_{k=1}^{2} [NR(k) \times FA(k) \times UC_{sr}(k) \times DD_{sr}(k)]$$

$$D_{cr} = P \times \sum_{l=1}^{3} [NH(l) \times UC_{cr}(l) \times DD_{cr}(k) + NH(l) \times UGUC_{cr}(l)]$$



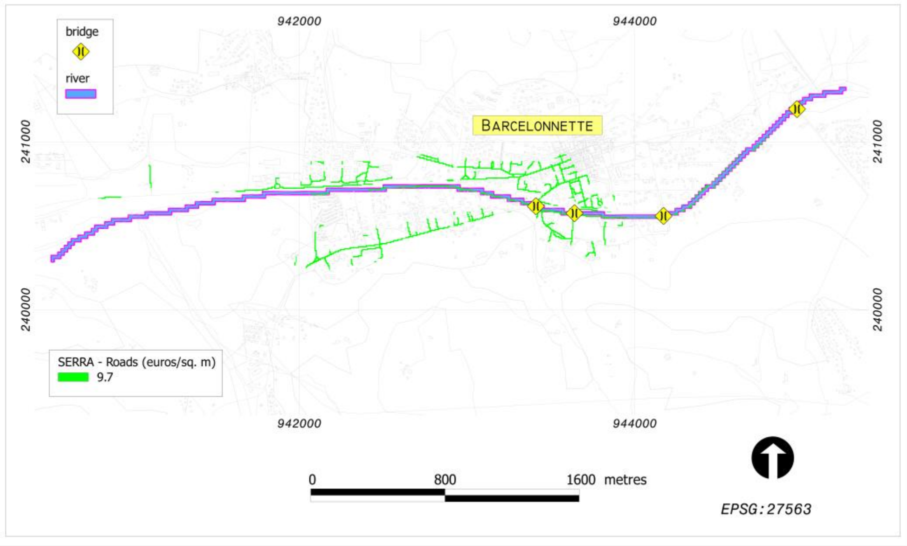
Baseline



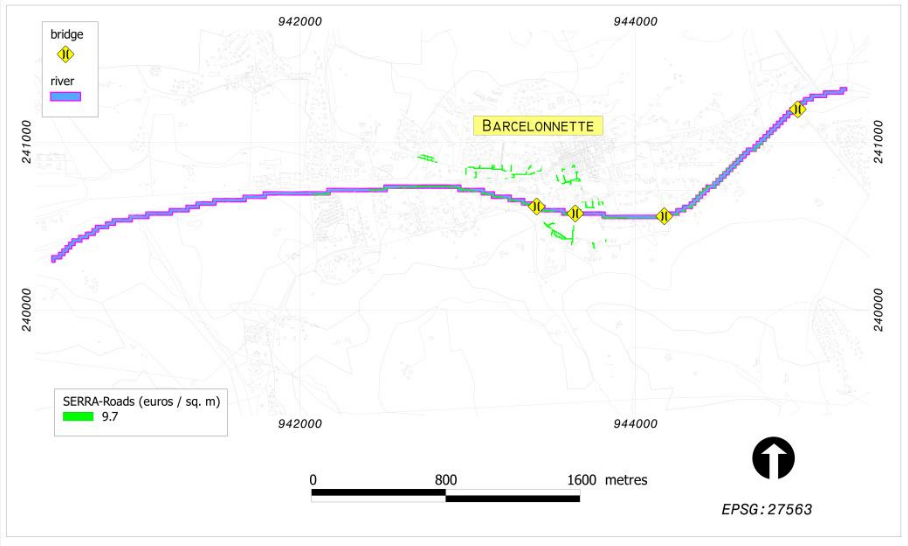
Scenario 1

Damage to roads

$$SD_x = \sum_{i=1}^{nc} [DR_c \times TC]$$



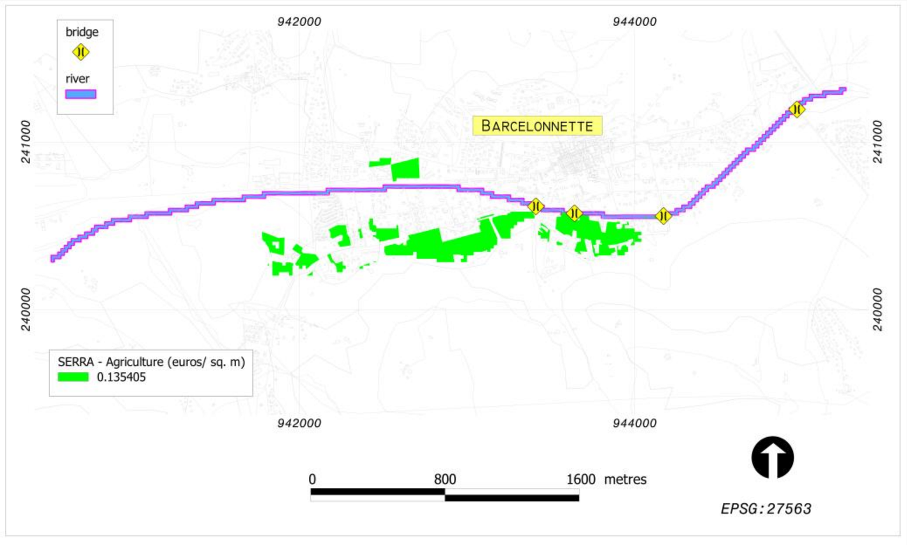
Baseline

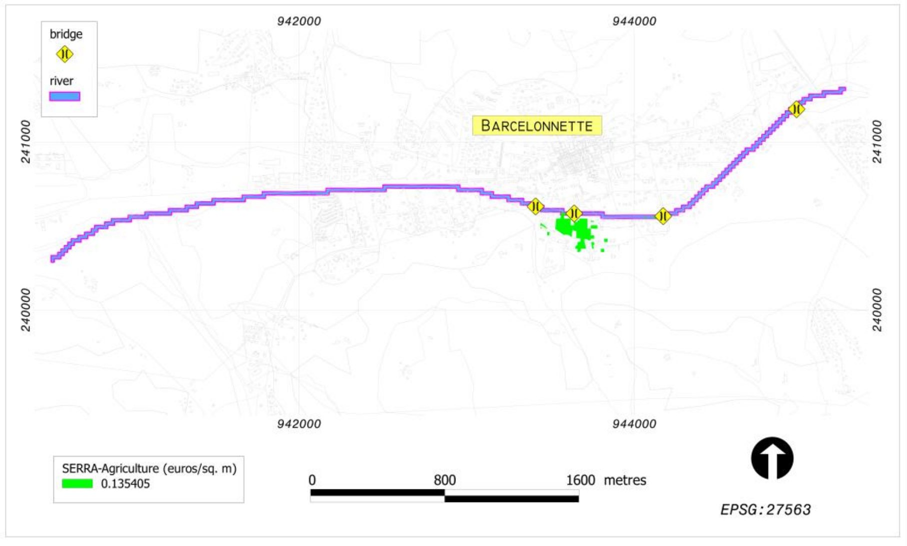


Scenario 1

Agriculture

$$AD = P_k \times \sum_{k=1}^{n} [D(k) \times A(k)]$$





Baseline

Scenario 1

Relative benefit (%) $rb = 100 \times \left(1 - \frac{cost(scenario)}{cost(baseline)}\right)\%$

Receptor	Scenario 1 (Better bridge section)	Scenario 2 (Early Warning System)	Scenario 3 (1 + 2)
People	64	15	70
Buildings	81	19	84
Infrastructure (roads)	68	28	77
Agriculture	90	10	91

Improvement of the bridge section gives a benefit of approximately 60 ~ 90% and the Early Warning System gives a benefit of 10~30%. However, the value of human beings is high and thus, scenario 3 gives the highest benefits (70 ~ 91%)

Outcomes/findings

- The methodology is comprehensive, adaptable and scalable
- the methodology was heavily data dependant (and rather overwhelming; especially for a small town in the Ubaye valley)
- How to determine weight factors?

Reflection/Lessons learnt

- The impact of the proposed methodology is best suited for higher-level stakeholders who have influence on policy implementation

- The addition of the cost of the proposed measures would counter-weight the benefit of the scenarios. e.g. the benefit of an early warning system is very low, compared to a bridge

- Uniformity in the equation terms in the RRA and SERRA would facilitate easier understanding