



Osservatorio Pratiche di Resilienza
FORUM 2016

Adattamento ai cambiamenti climatici e resilienza locale

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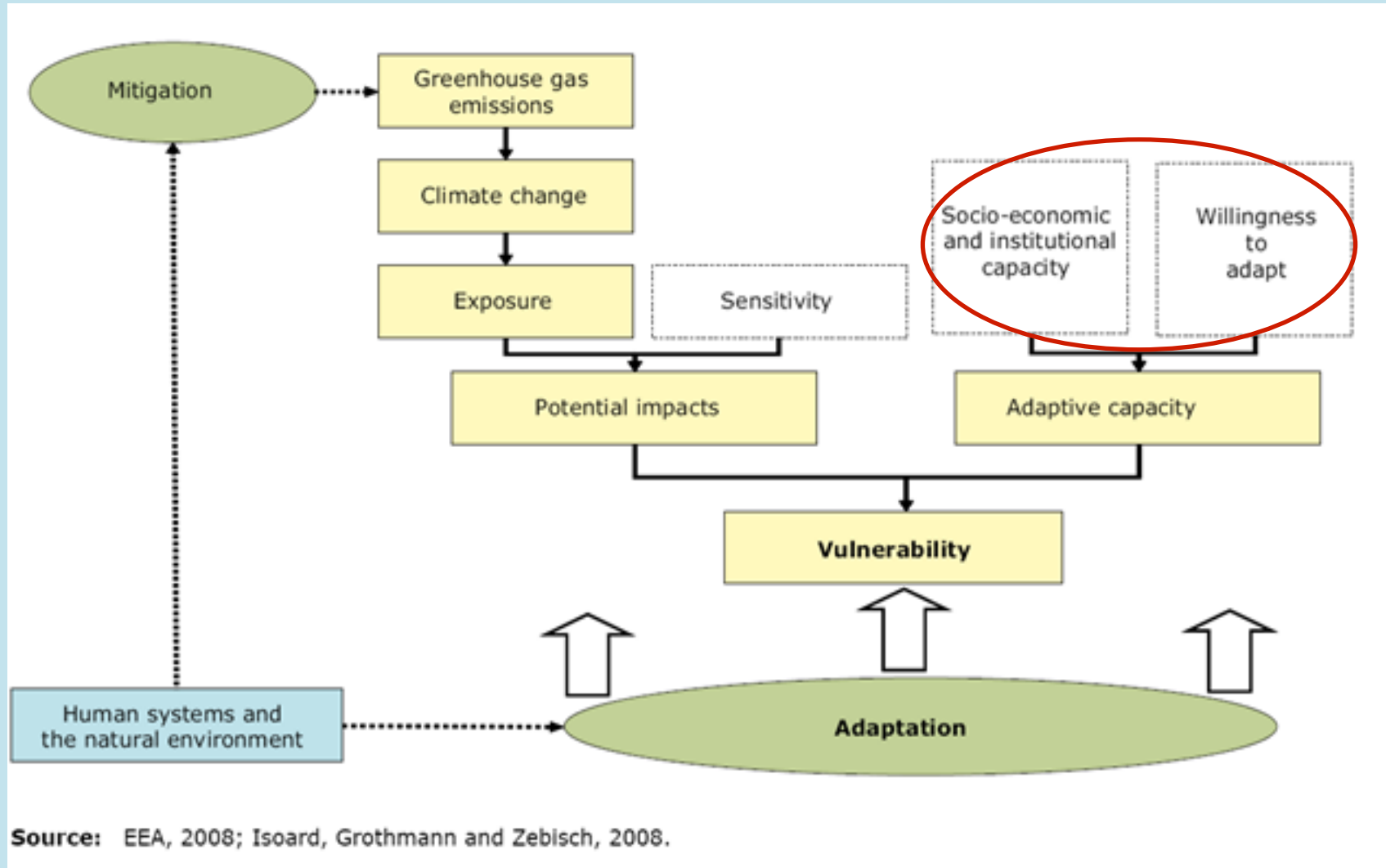
Milano, 29 gennaio 2016

What is adaptation?

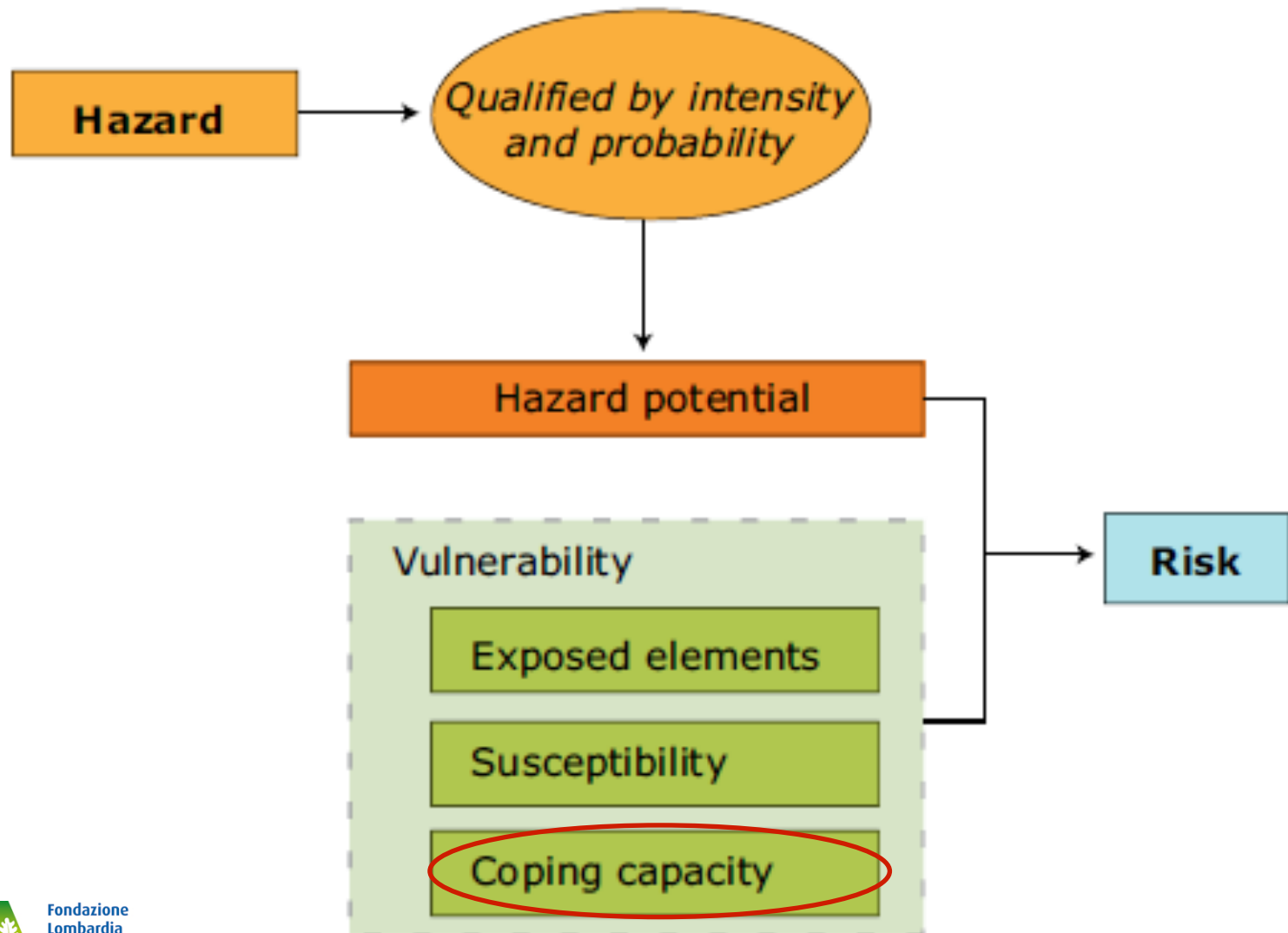
“The adjustment of natural or human systems to actual or expected climate change or its effects in order to moderate harm or exploit beneficial opportunities.”

(IPCC, 2007)

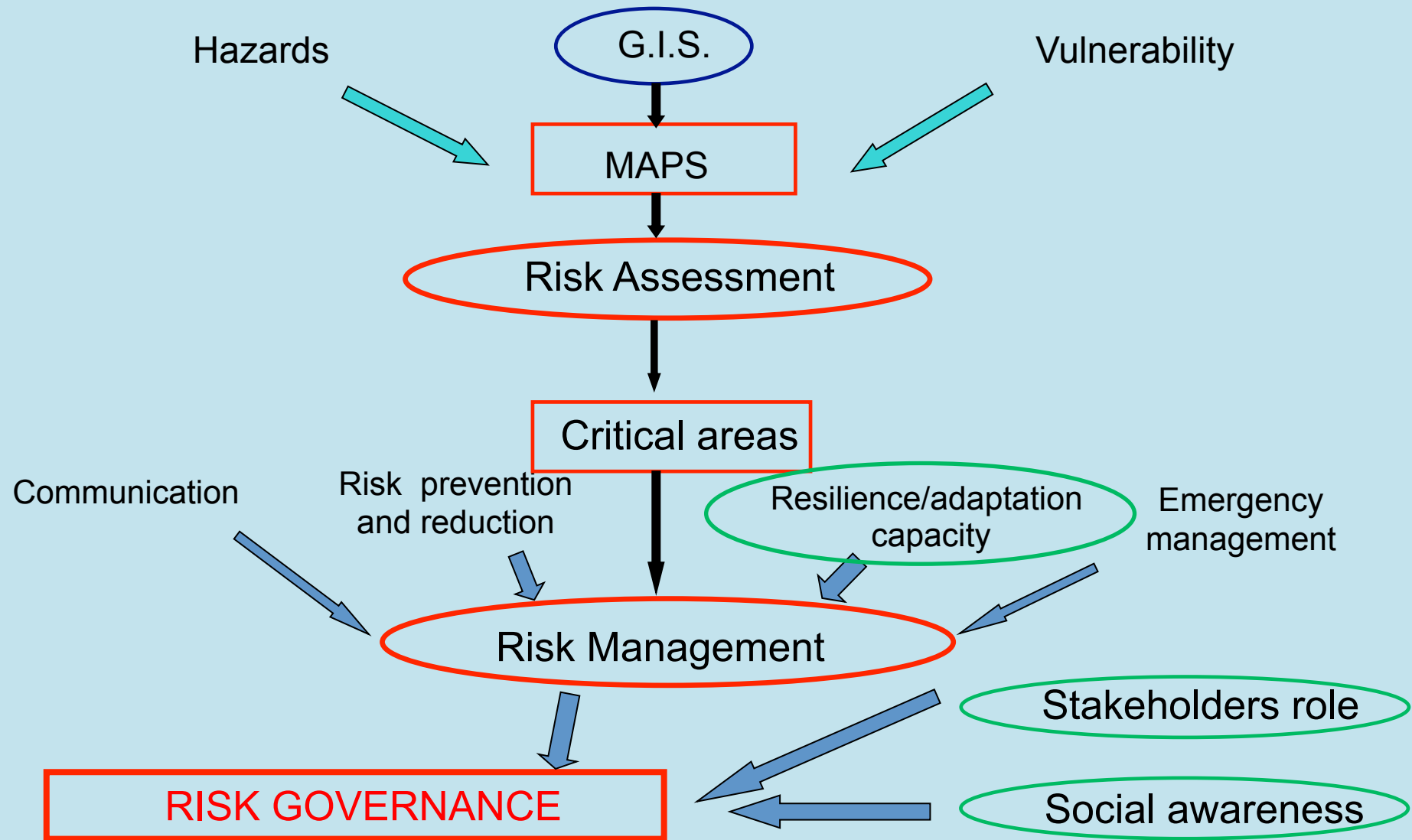
Climate change: mitigation vs adaptation



The CC adaptation approach: risk assessment and management

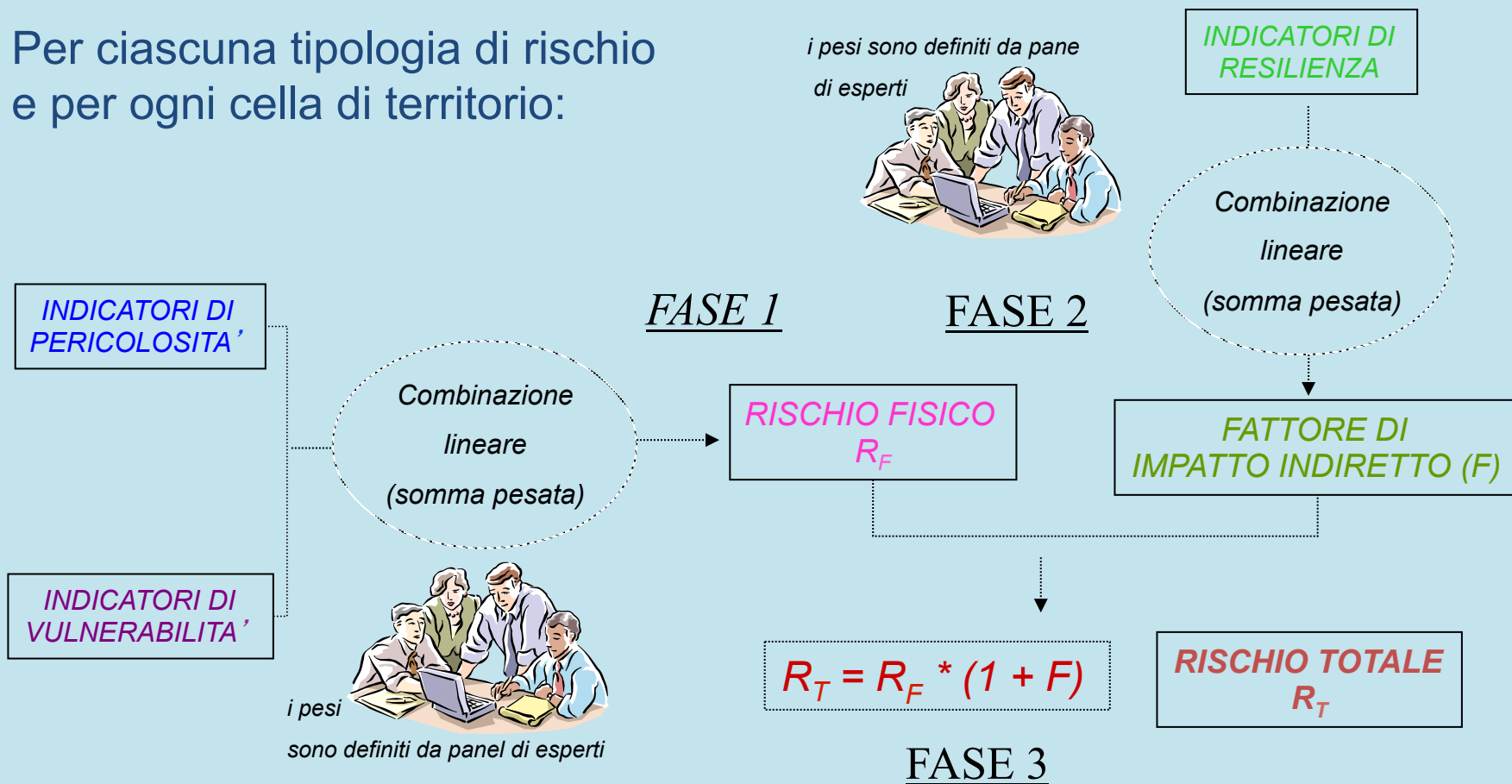


Risk governance: methodology



La procedura di valutazione del rischio

Per ciascuna tipologia di rischio e per ogni cella di territorio:

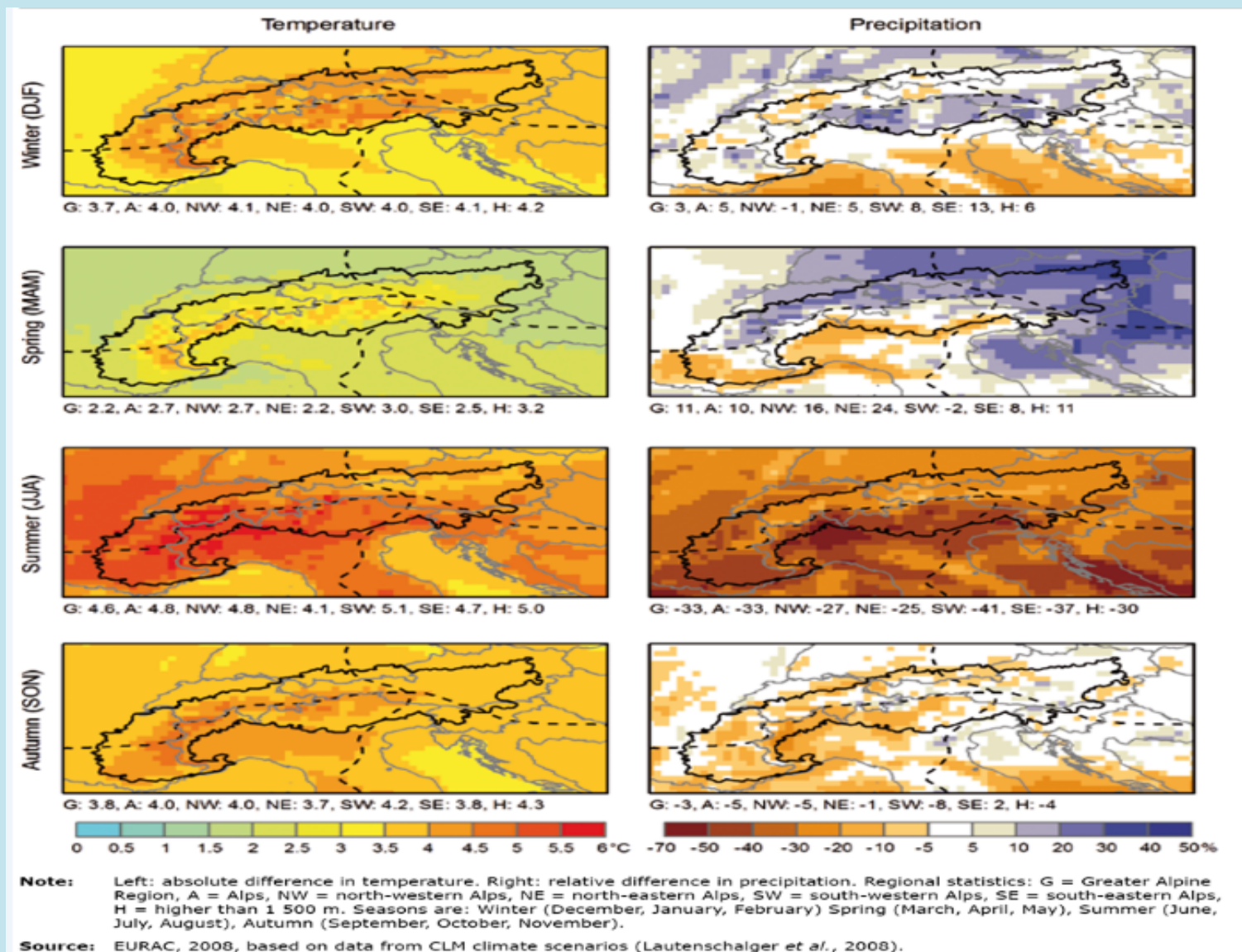


Rischi naturali e cambiamento climatico

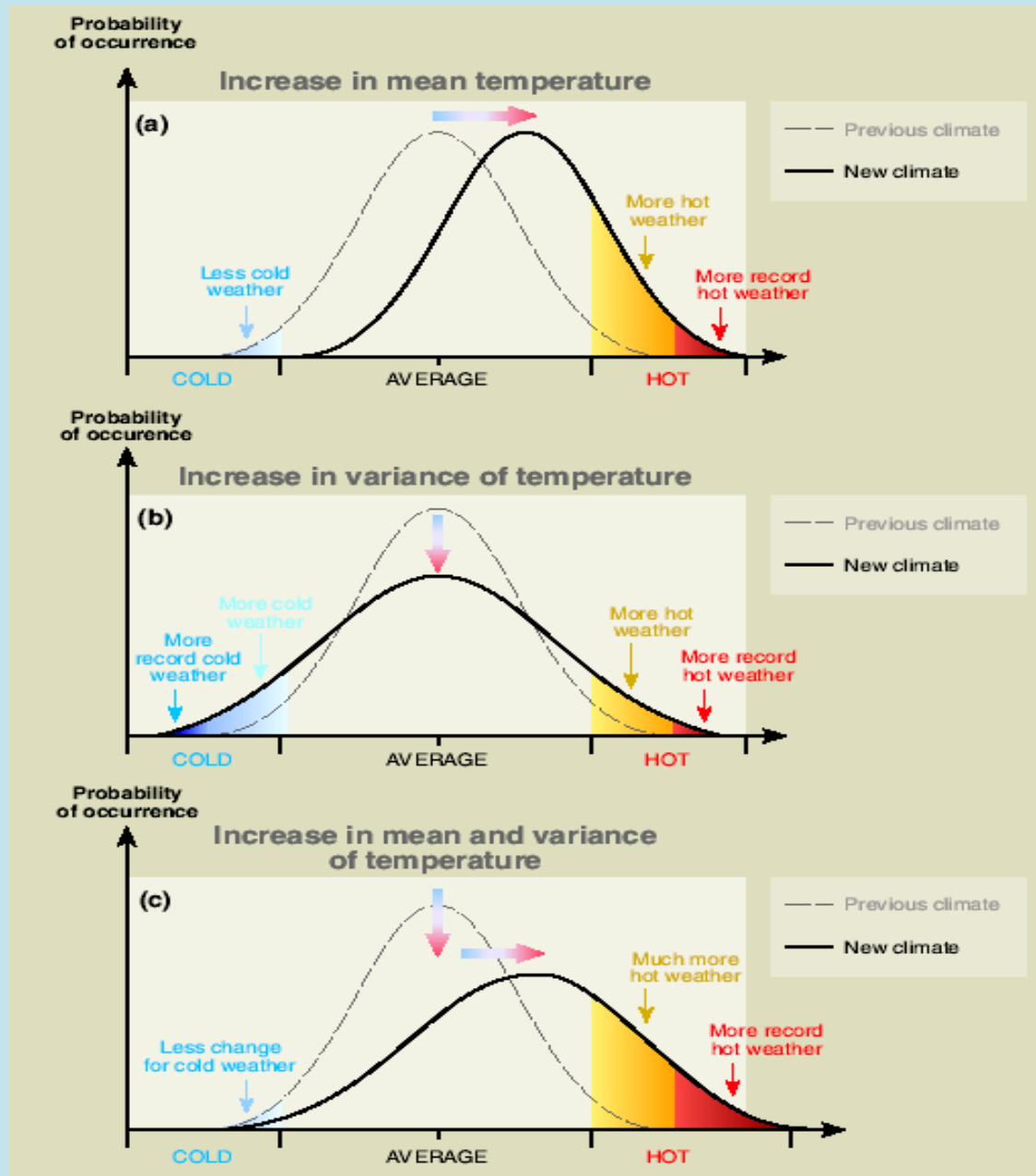
Alcuni rischi naturali sono influenzabili dalla deriva climatica globale e dall'incremento in frequenza e intensità di eventi meteorologici estremi



Assessing impacts: the climatic drivers



Assessing impacts: the extreme weather events



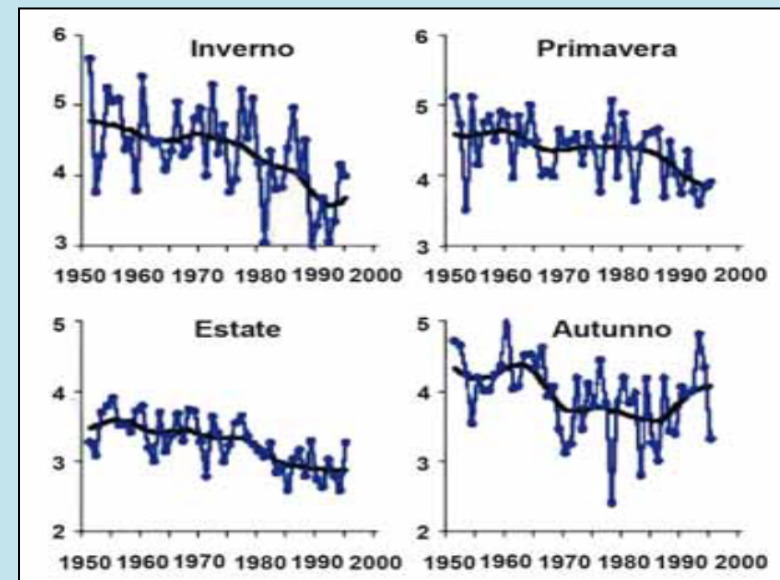
Climate change indirect impacts: air quality

✓ Increase in the concentration of air pollutants because of unfavorable weather conditions affect their formation and removal

✓ Increased formation of secondary air pollutants (O_3 and PM10)

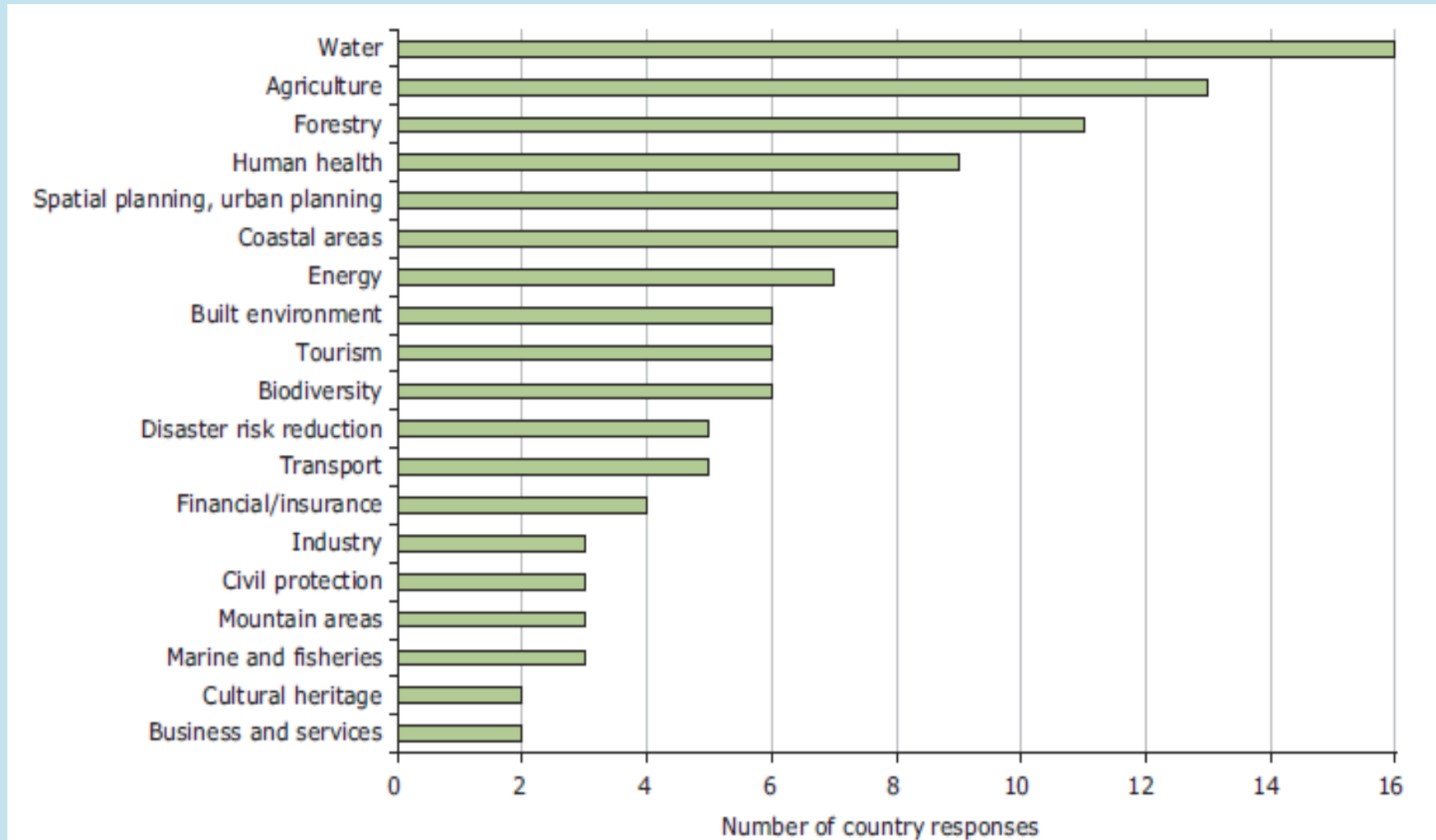
Variable	Ozone	PM
Temperature	++	-
Regional stagnation	++	++
Wind speed	-	-
Mixing depth	=	--
Humidity	=	+
Cloud cover	-	-
Precipitation	=	--

Correlation between sensitivity of ozone and particulate matter with the main meteorological variables that influence its formation / presence in the air. Correlation consistently positive (+), generally positive (+), weak or variable (=), generally negative (-), and consistently negative (-). Source: D.J. Jacob, DA Winner, 2009



Average cloud cover trend in North Italy from 1950 to 2000. Source: Maugeri et al., 2001

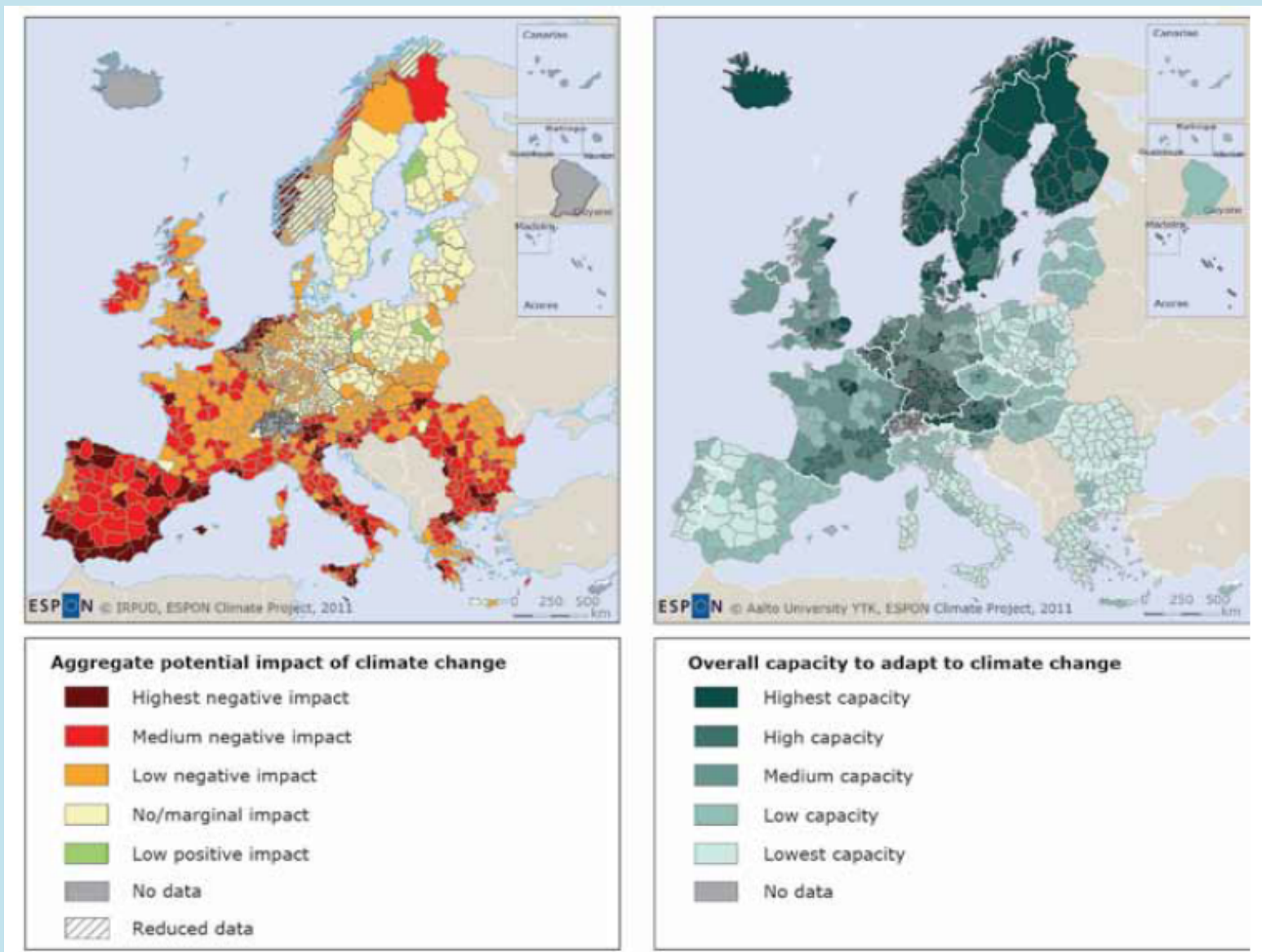
Selection of targets



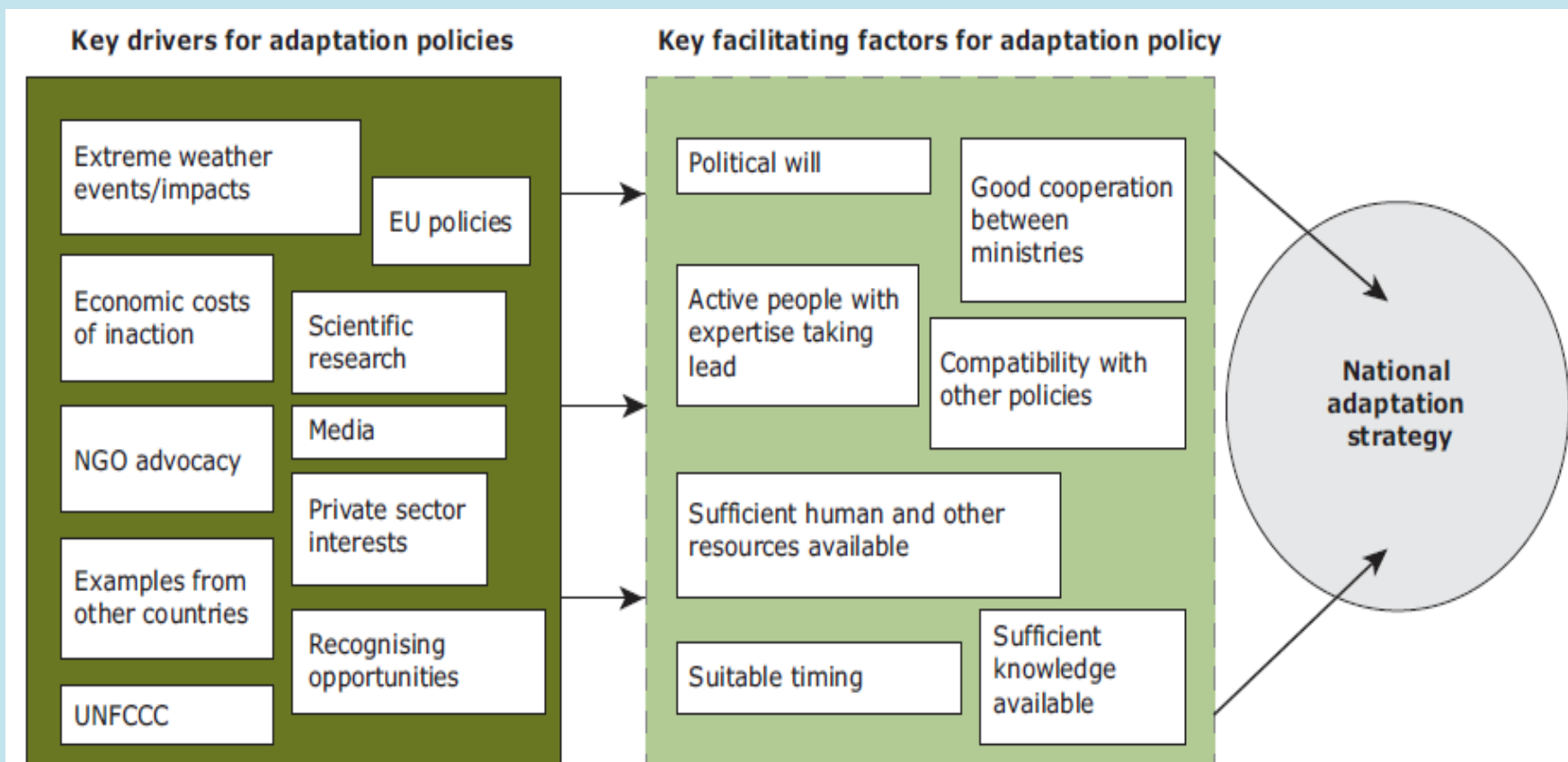
Priority targets depend on climate pressures ...



... and local vulnerability & resilience factors



The adaptation process: drivers and success factors



Source: Swart et al., 2009.

Adaptation options

- “Soft” measures: managerial, legal and policy approaches that aim at altering human behavior or styles of governance
- “Grey” measures: hard options aimed at reducing vulnerability to CC and/or enhance resilience
- “Green” measures: based on use of natural systems or ecosystem services

Key steps: estimate costs and benefits

- *Use the most suitable approach (costs&benefits, cost effectiveness, multi-criteria analyses*
- *Consider all costs and benefits: economic, social, environmental*

Ensure a multilevel governance

- *Policy coherence*
- *Policy integration in territorial governance and spatial planning*
- *Building capacity across all levels of governance*
- *Securing access to funding for adaptation measures*
- *Developing the multi-level knowledge base*

Involve stakeholders

- *Institutional (sub-regional level)*
- *Administrative (official of the sectors involved)*
- *Economic (industry, agriculture, services)*
- *Social (education, communication, participation)*

Monitor, Report, Evaluate

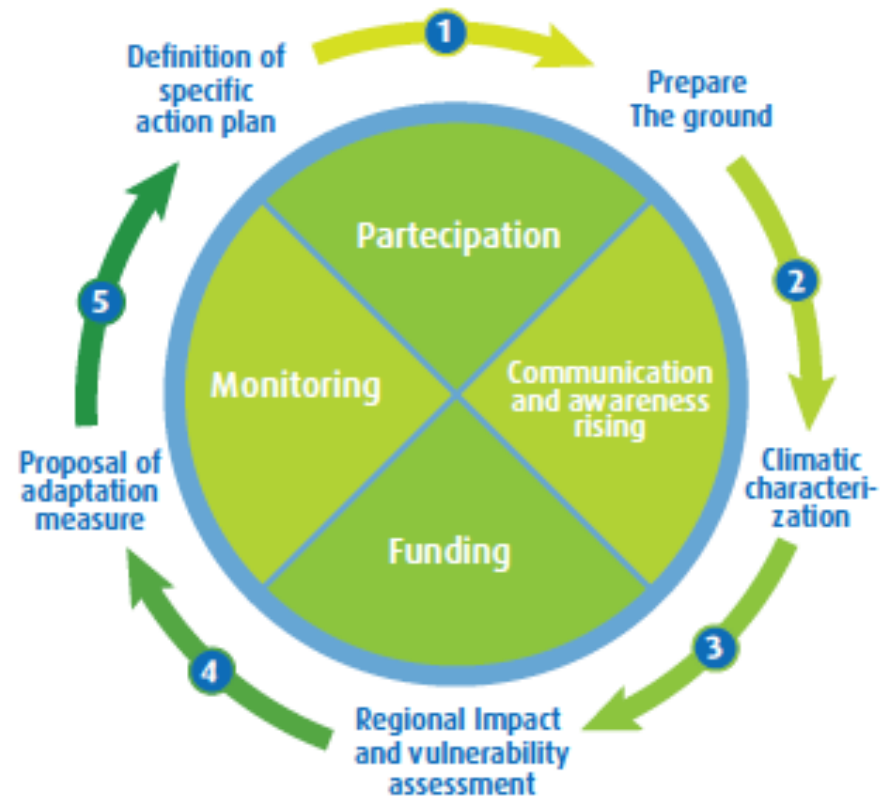
- *Select proper indicators of process and outcome (suitable for an effective data collection)*
- *Use current indicators as proxys (but be wary of other influencing factors)*
- *Adjust existing M&E systems*
- *Envisage new resilience indicators*

Avoid malpractices

- *Increase emissions of greenhouse gases*
- *Disproportionately burden the most vulnerable people*
- *Have higher opportunity costs*
- *Reduce incentives to adapt*
- *Set paths that limit the choices available to future generations*
- *Transfer vulnerability to a neighboring area or country*

The Lombardy regional adaptation strategy

Key steps in the Lombardy RAS



adapted from Ribeiro et al. 2009

RAS: main sectors and working program

Main sectors

1. Ecosystems, forests, biodiversity and protected areas;
2. Air quality;
3. Water resources;
4. Energy supply;
5. Human health;
6. Built environment
7. Hydro-geological risk
8. Transport and mobility;
9. Agriculture;
10. Tourism.

Working program

Phase 0

collection of basic documentation and organization of the RAS

Phase I.

Construction of the climatic bases of the RAS

Phase II

Sectoral impact and vulnerability assessment

Phase III

Definition of the lines of action for the adaptation process

Phase IV

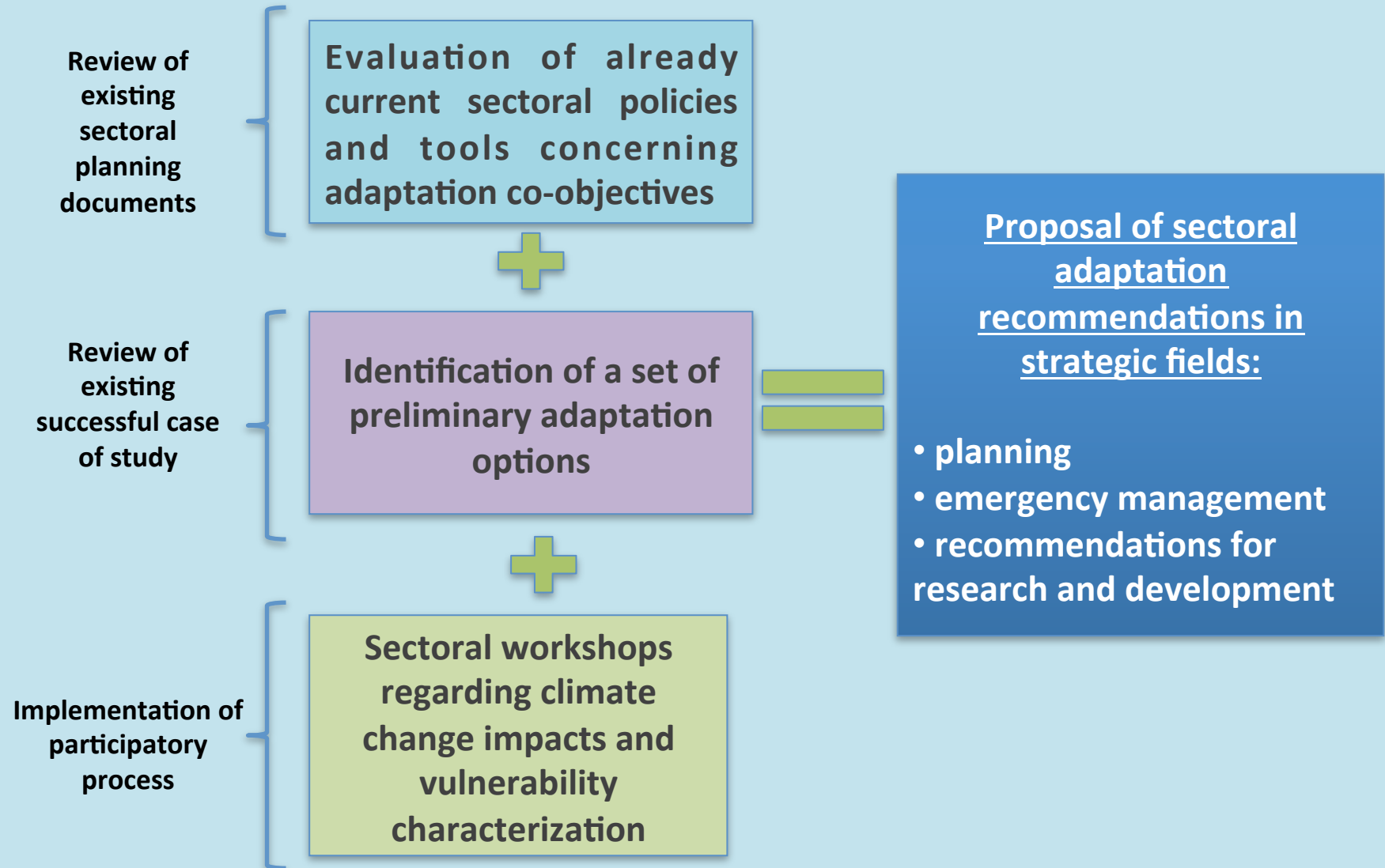
Definition of the specific actions and measures for adaptation

causal matrix: climatic stressor versus climatic impacts by sector

Plenary

ksho
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Policy review and sectoral recommendations



Adaptation priorities and specific adaptation options

Relevant impacts per sector

Adaptation objectives

Proposed adaptation measures

Nome/cognome: _____
 Email: _____

FI Fondazione Lombardia per l'Ambiente

Risorse idriche: Obiettivi settoriali per l'adattamento e proposta di misure di adattamento

<i>Ciclo idrologico e qualità delle acque</i>		<i>Obiettivi strategici per l'adattamento</i>		<i>Proposta di misure di adattamento¹</i>	
Impatti	<i>Importanza relativa dell'impatto</i>	Obiettivi	<i>Necessità d'intervento</i>	Proposta	
	<i>Importanza (1-5)</i>		<i>Necessità (1-5)</i>		
1-Alterazione delle caratteristiche fisico-chimiche e biologiche delle acque superficiali e sotterranee (Qualità)		1.1 Ampliare e rinforzare le reti di misurazione, monitoraggio e sorveglianza delle risorse idriche superficiali e sotterranee		Soft o non strutturali: 1. Potenziare ed estendere gli attuali strumenti e reti di monitoraggio e il controllo della qualità delle risorse idriche lombarde (identificare i gap esistenti nell'attuale rete di monitoraggio costituita da 260 punti di prelievo e misura, relativi a 175 corpi idrici superficiali) ^(1.1; 2.1; 2.2; 3.3) 2. Intensificare il controllo dell'evoluzione del grado di diluizione degli inquinanti nelle acque sotterranee durante i periodi a maggiore rischio (es: periodi siccitosi prolungati) ^(1.1; 1.2; 1.3; 2.3; 3.1) 3. Rinforzare la prevenzione dei casi di penuria, fioriture algali e peggioramento eccessivo della qualità dei corpi idrici in considerazione all'incremento di eventi climatici estremi (es: intensificare il monitoraggio dell'influenza degli scarichi termici nelle acque superficiali) ^(1.1; 1.3) 4. Minimizzare i disturbi associati alla captazione e al rilascio di acque dalle centrali idroelettriche e termoelettriche ^(1.3; 2.1; 2.2; 2.3) 5. Ampliare la caratterizzazione dettagliata delle acque del territorio regionale e concretamente completare la cartografia dettagliata (e informatizzata) del reticolo irriguo minore ^(1.1; 2.1; 2.2; 3.3; 4.4)	
		1.2 Incrementare la resilienza dei corpi idrici alle implicazioni del mutamento del clima per assicurare servizi e forniture			
		1.3 Garantire lo stato ecologico delle risorse idriche regionali e considerare i mutamenti			
		1.4 Applicare le conoscenze sulle implicazioni dei cambiamenti nella qualità			

Weighting process (2 parameters)

i. Relevance of each impact from a sectoral point of view

ii. Need for actions to fulfill each adaptation objective

¹ I superindici localizzati alla fine di ogni proposta di misura di adattamento fanno riferimento agli **obiettivi strategici** per i quali la misura in questione si prevede abbia delle **sinergie positive per il raggiungimento di tali obiettivi.**



Voltaire, 1694-1778

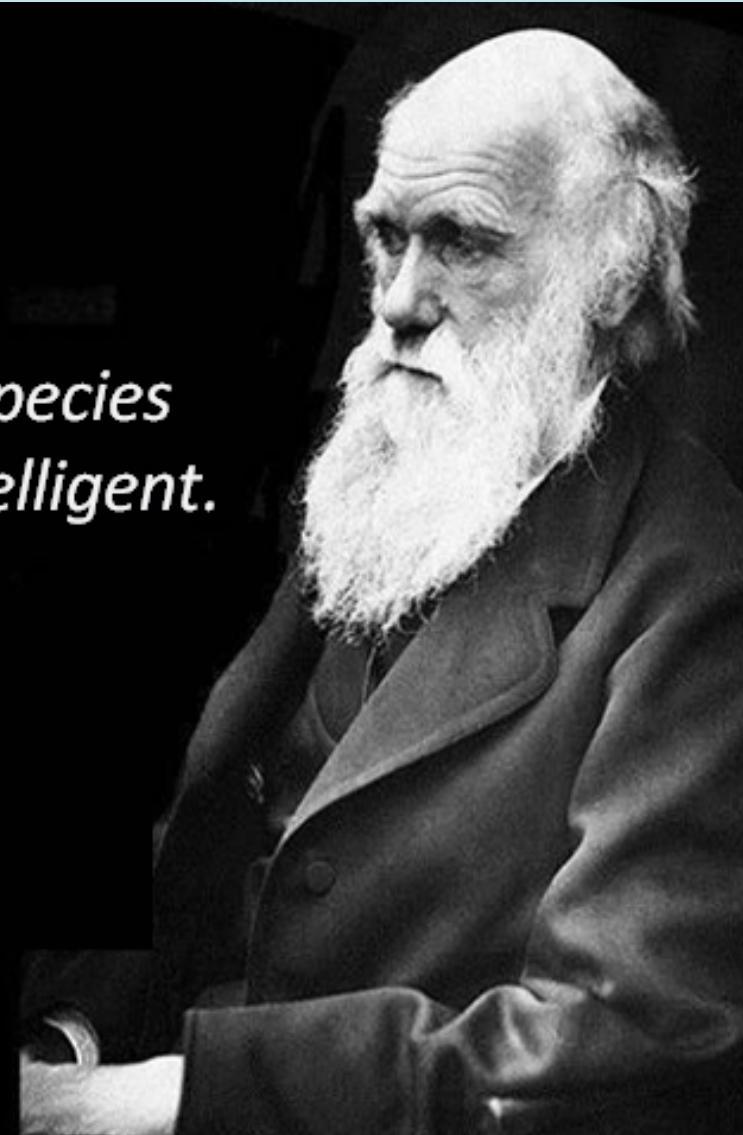
« *Les hommes discutent,
la nature agit* »

“Men argue, nature acts”

Adaptation capacity is an emerging mindset

“It is not the strongest of the species that survives, nor the most intelligent. It is the one that is the most adaptable to change”

Charles Darwin (1809-1882)



Thank you for your attention!