



The modeling elements in a new methodology by EFSA to assess environmental impact of plant pests

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JOINT EFSA-EPPO WORKSHOP

Modelling in Plant Health: How can models support risk assessment of plant pests and decision making?

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ENVIRONMENTAL RISK ASSESSMENT IN PLH



Pest Risk Assessment

Pest Identification

Entry Establishment Spread

Impact

Evaluation of Risk Reduction Options

Pest risk assessment process
→ ISPM No 11

It includes an assessment of the environmental consequences (ERA) but without defining **what is biodiversity** and **consequences on ecosystem processes, structure, stability** and how to assess them

On cultivated and managed plants

On the environment

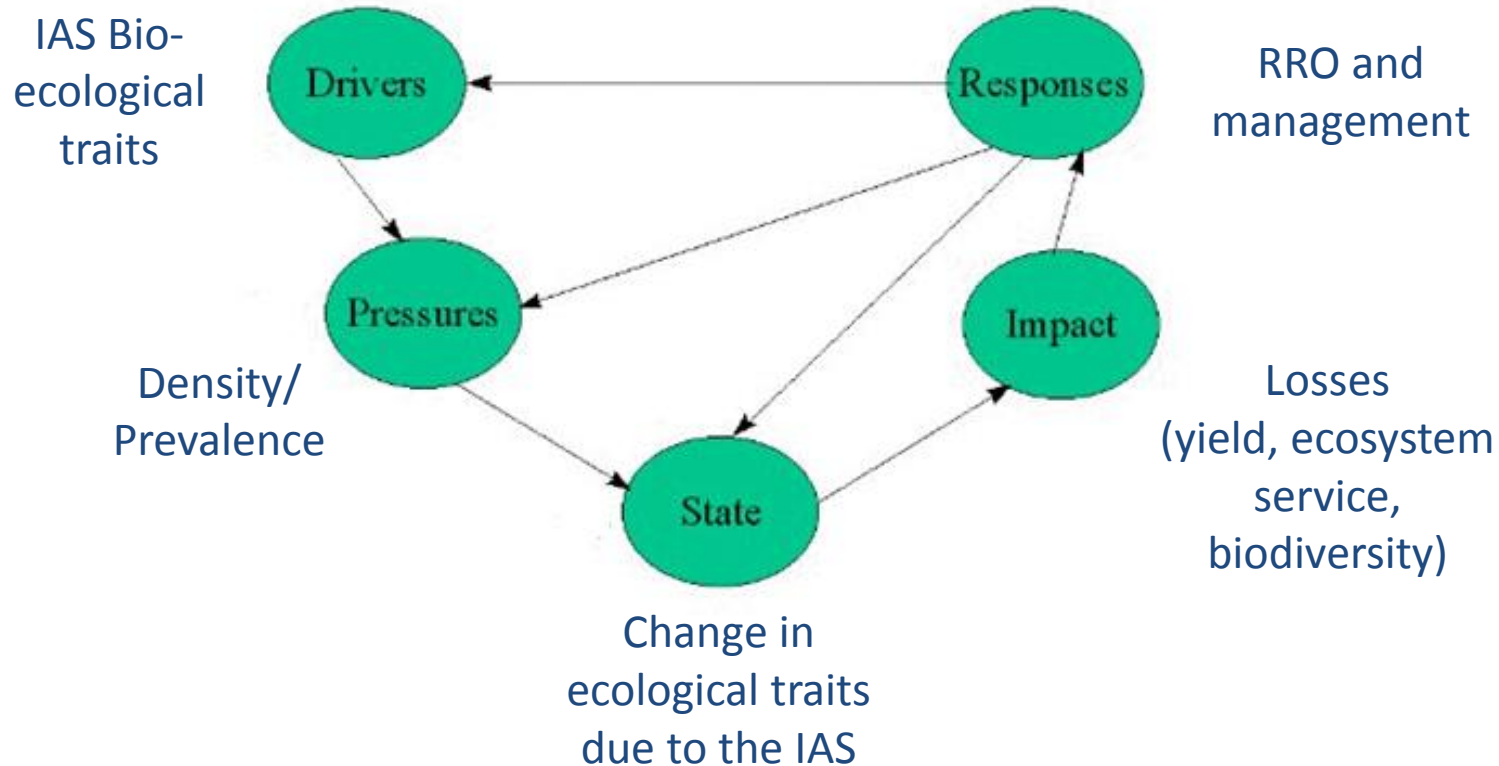


THE DPSIR SCHEME FOR IAS

- Assessment based on projections and scenario analysis
- Driver
 - Biological and ecological (functional) traits of the IAS
- Pressure
 - Abundance (number or biomass) or prevalence (for a disease or a symptoms-rated measure of abundance) and the ecological pressure of the species
- State
 - Reaction of the receiving environment
 - Is considered in the scenario analysis
 - Link between ecosystem traits and ESs and BCs
- Impact
 - Pressure → Ecosystem Traits → Ecosystem services and Biodiversity

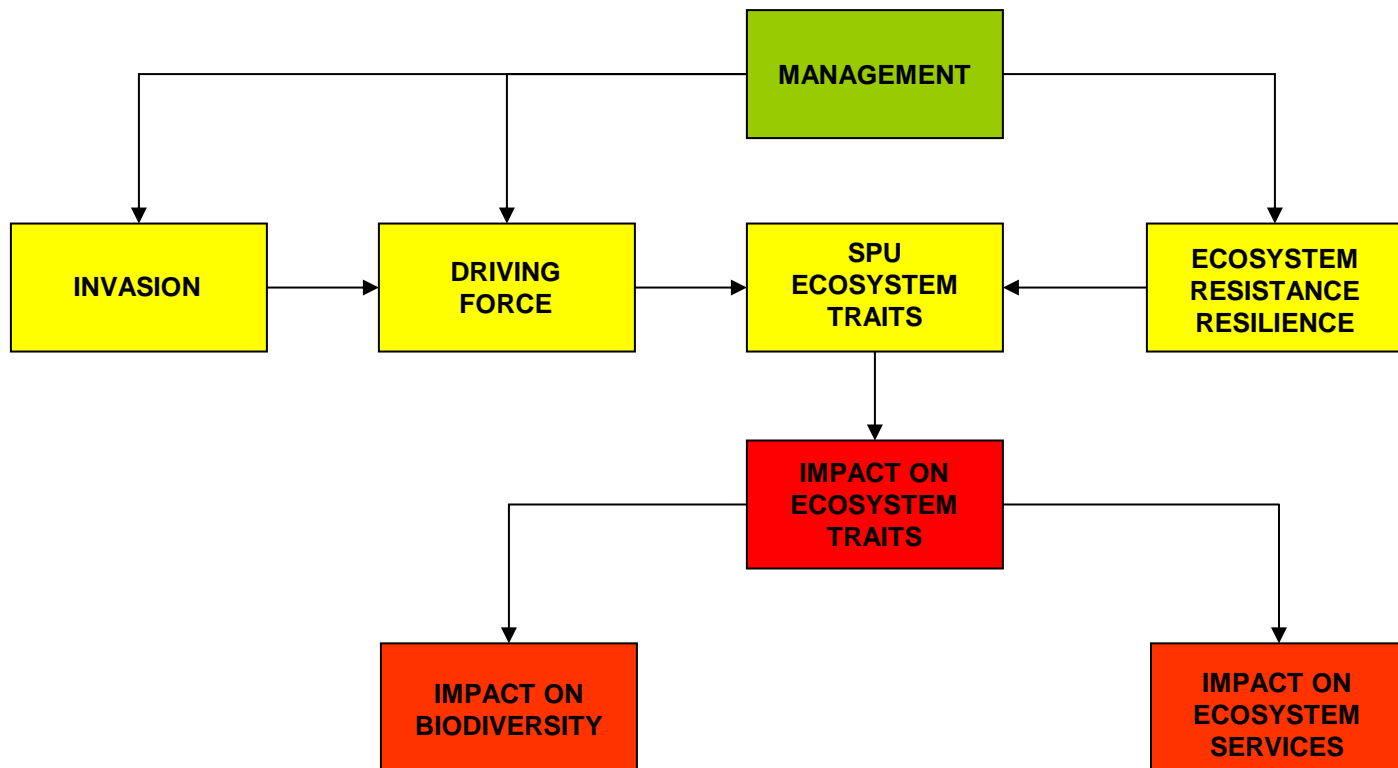
THE DPSIR SCHEME FOR IAS

The DPSIR Framework For Reporting on Environmental Issues





THE DPSIR SCHEME FOR IAS



AN APPLICATION: *Anoplophora chinensis*



Contents lists available at ScienceDirect

Science of the Total Environment

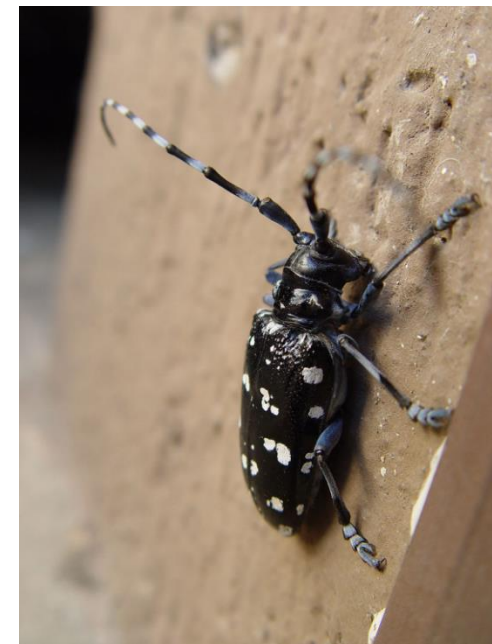
journal homepage: www.elsevier.com/locate/scitotenv



Environmental risk assessment for plant pests: A procedure to evaluate their impacts on ecosystem services



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Di Paolo Gibellini - Anoplophora Chinensis Sony DSC F717, Pubblico dominio, <https://commons.wikimedia.org/w/index.php?curid=4449170>

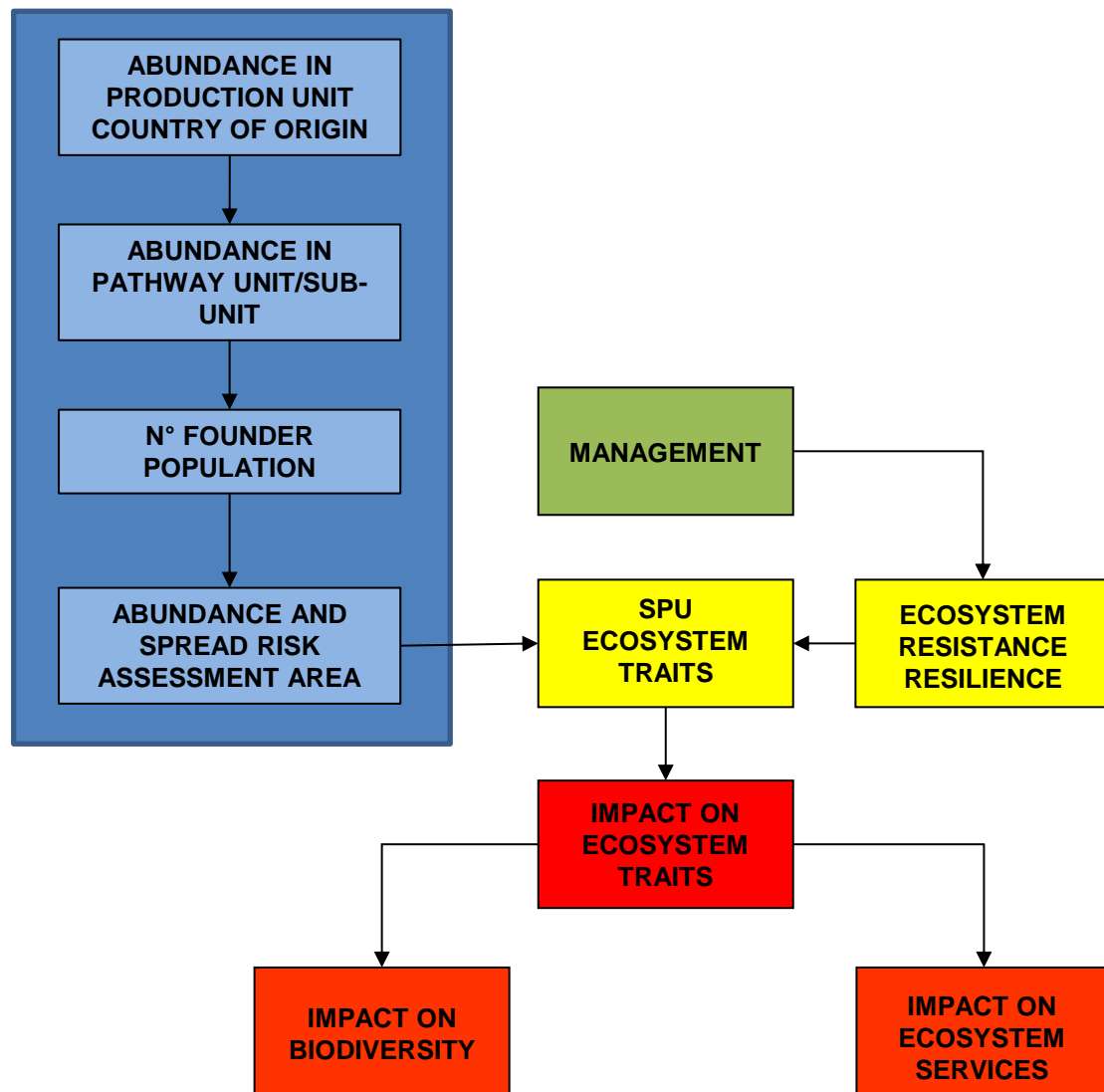
Table 3

Probability distribution of the expected reduction in ES provision level L for the provisioning services and the regulating and supporting services as a consequence of the invasion of *Anoplophora chinensis* in Europe. The risk rating refers to the SPU and the assessment is performed according to the assumptions made in the scenario.

Type of ES	ES	Probability distribution of the reduction in the ES L				
		$L = 0$ or negligible	$0 < L \leq 5\%$	$5 < L \leq 20\%$	$20 < L \leq 50\%$	$50 < L \leq 100\%$
Provisioning	Fiber	0	10	45	40	5
	Ornamental	0	0	20	60	20
	Primary production	0	30	40	30	0
Regulating and supporting	Air quality	0	40	40	20	0
	Climate regulation	30	60	10	0	0
	Water regulation and cycling	15	60	20	5	0
	Erosion regulation	0	30	40	30	0
	Nutrient cycling	5	45	40	10	0

CONNECTION WITH THE PLH NEW METHODOLOGY

- Mechanistic-based PRA invasion process is seen as flow of events and processes
- Represented (measured) in terms of change in pest population abundance
- All steps and sub-steps are connected
- Integration of RROs into the Risk Assessment (quantification of the effects)



THE ERA OF *Pomacea* spp.

- Originally from South or Central America → Asia, North America, Europe
- Three developmental stages: eggs, juveniles, adults
- Extremely adaptive to environmental conditions in wetlands, freshwater ecosystems and rice paddies
- Highly reproductive
- One of the 100 World's Worst Invasive Alien Species



THE ERA OF *Pomacea* spp.



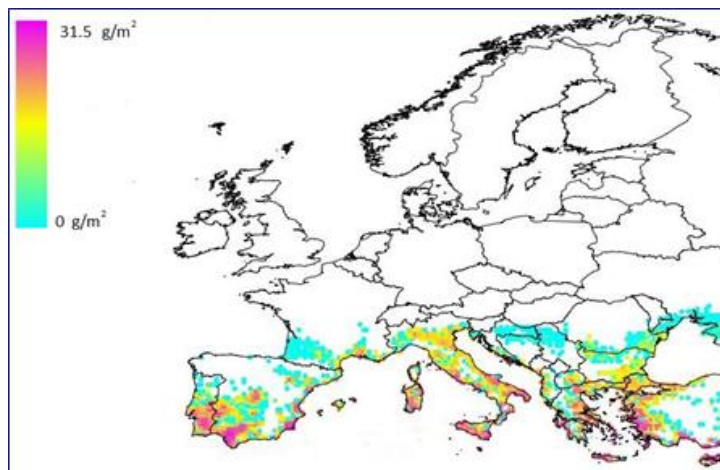
- Extremely polyphagous
- Damaging freshwater macrophytes predominant environments
- 1 snail feeds on 17 rice plants/day !



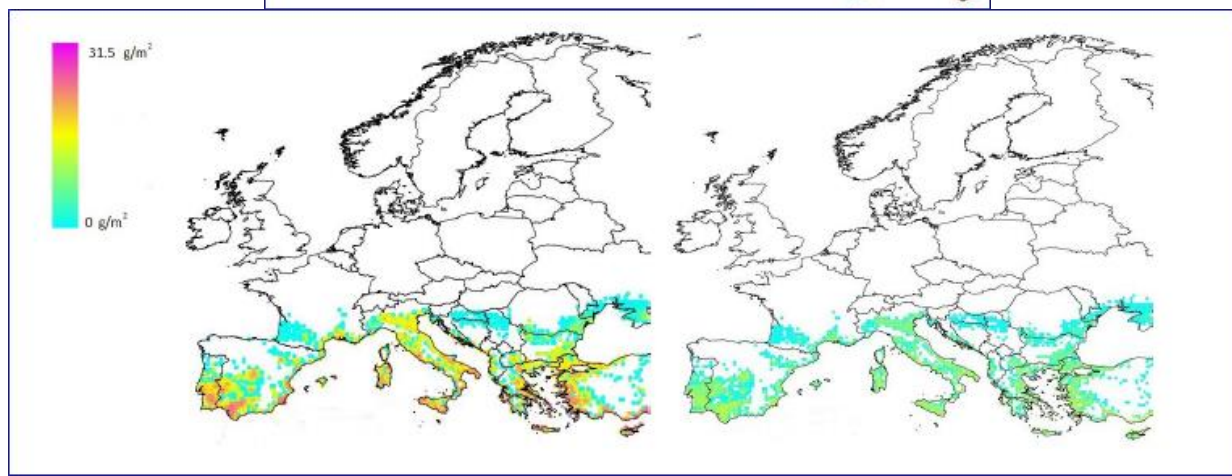
Consequences
on natural
habitats

MODELING ELEMENTS: POTENTIAL DISTRIBUTION

- Modelling the spatial distribution of the pest abundance
 - ERA *Pomacea* spp.: Potential and realized biomass

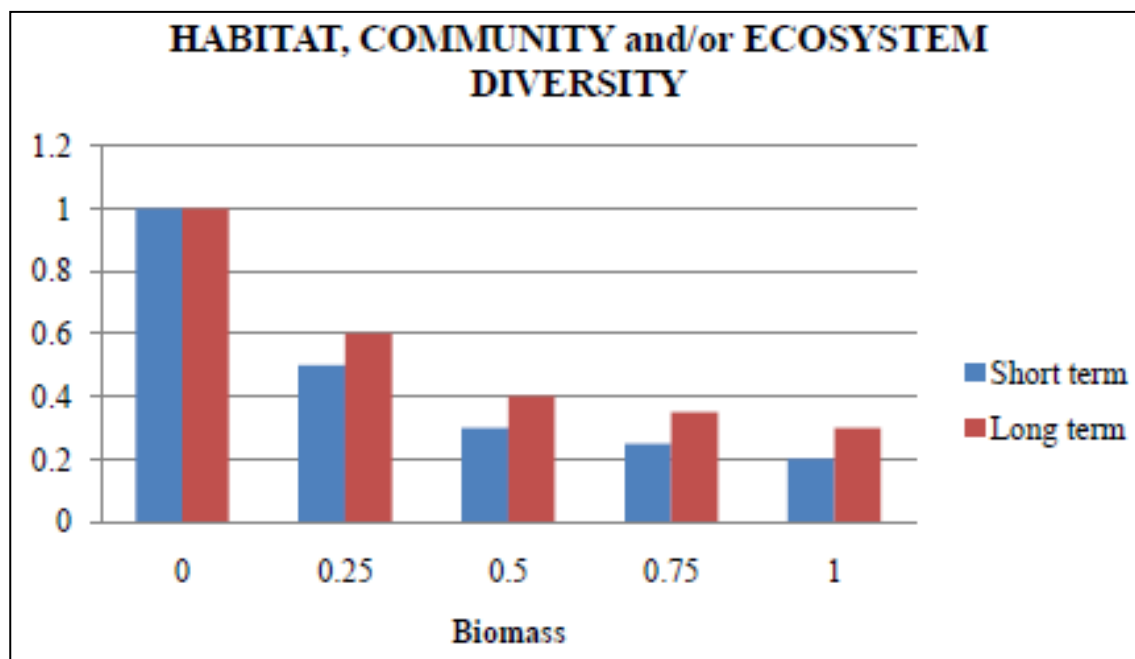


In preparation for
Diversity and
Distributions



MODELING ELEMENTS: ABUNDANCE AND IMPACT

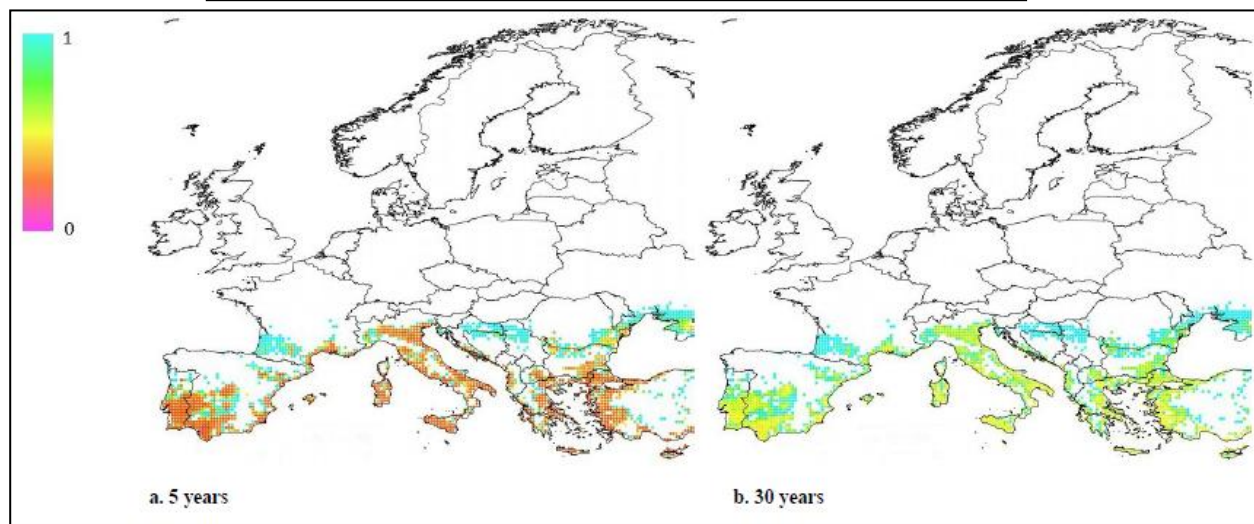
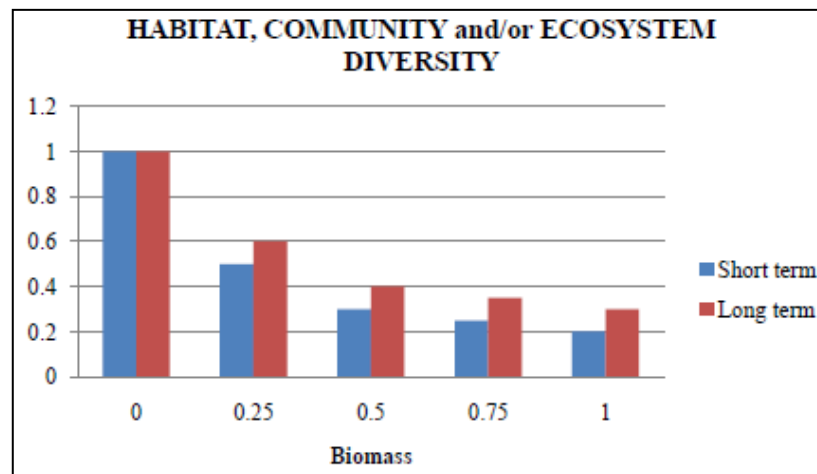
- Modelling the link between the population abundance and the impact



Submitted to
 Environmental Impact
 Assessment Review

MODELING ELEMENTS: SPATIAL DISTRIBUTION

- Modelling the spatial distribution of the impact
 - ES: Water regulation/cycling/purification

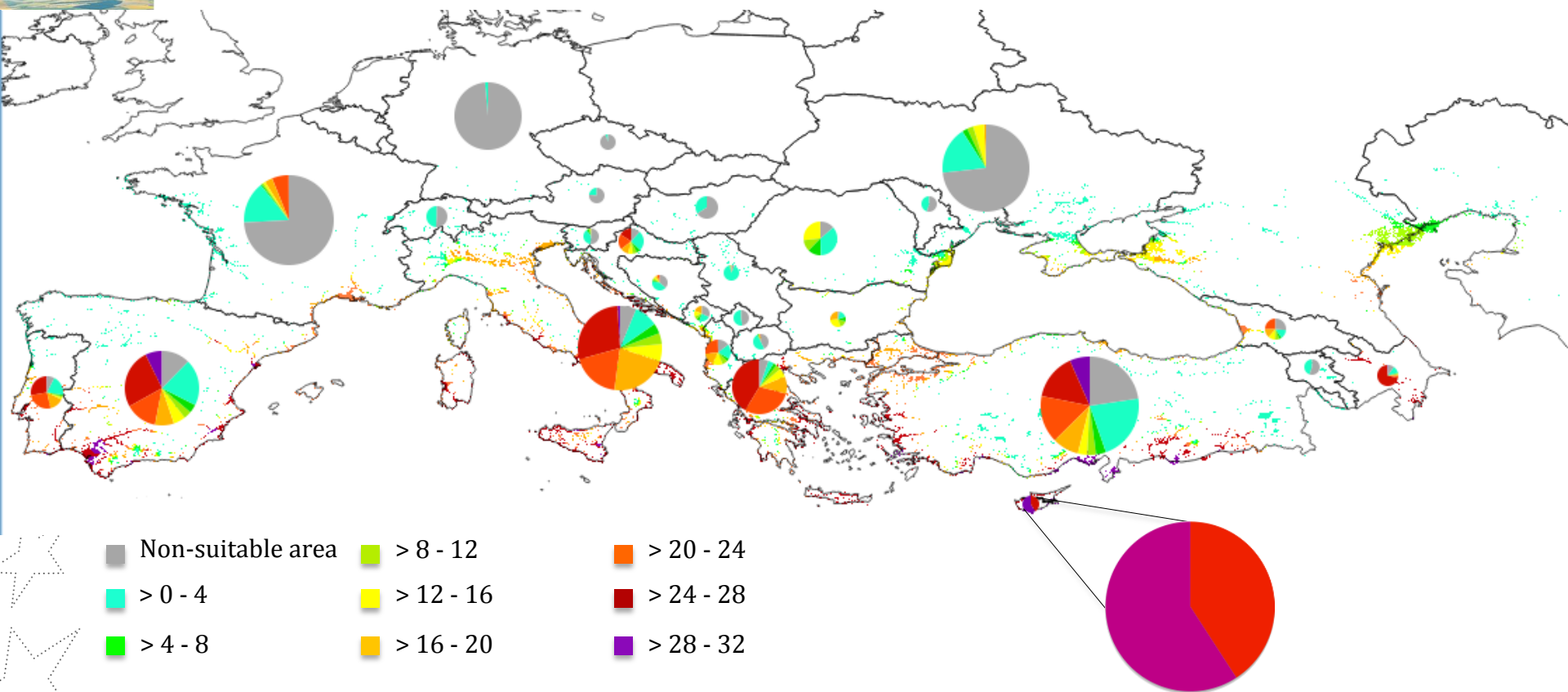




MODELING ELEMENTS: SUITABLE HABITATS

- Modelling the distribution and impact in suitable habitats

P. canaliculata biomass (g/m²) > 0





MODELING ELEMENTS: HABITATS OF INTEREST

Natura 2000 areas with *P. canaliculata* biomass (g/m^2) > 0

> 28 - 32



CONCLUSIONS

- Increasing need for ERA in pest risk assessment field
- Assessment of overall environmental risk
 - Integration of the impacts on different components and levels of the environment, and their probabilities of occurrence
- Integrated approach: models, experts knowledge elicitation, rating system, uncertainty, etc.
- Flexible methodology: modular, adaptable, possibility of simple approaches
- EKE: quantitative assessment
- Different assessments can be compared more easily
- New tests and examples



THANK YOU FOR YOUR
ATTENTION !

