Options for developing an integrated framework to assess the impacts of exotic plant pests in Europe

23-26 August 2016, ML Espaldon, W van der Werf, MCM Mourits, AGJM Oude Lansink

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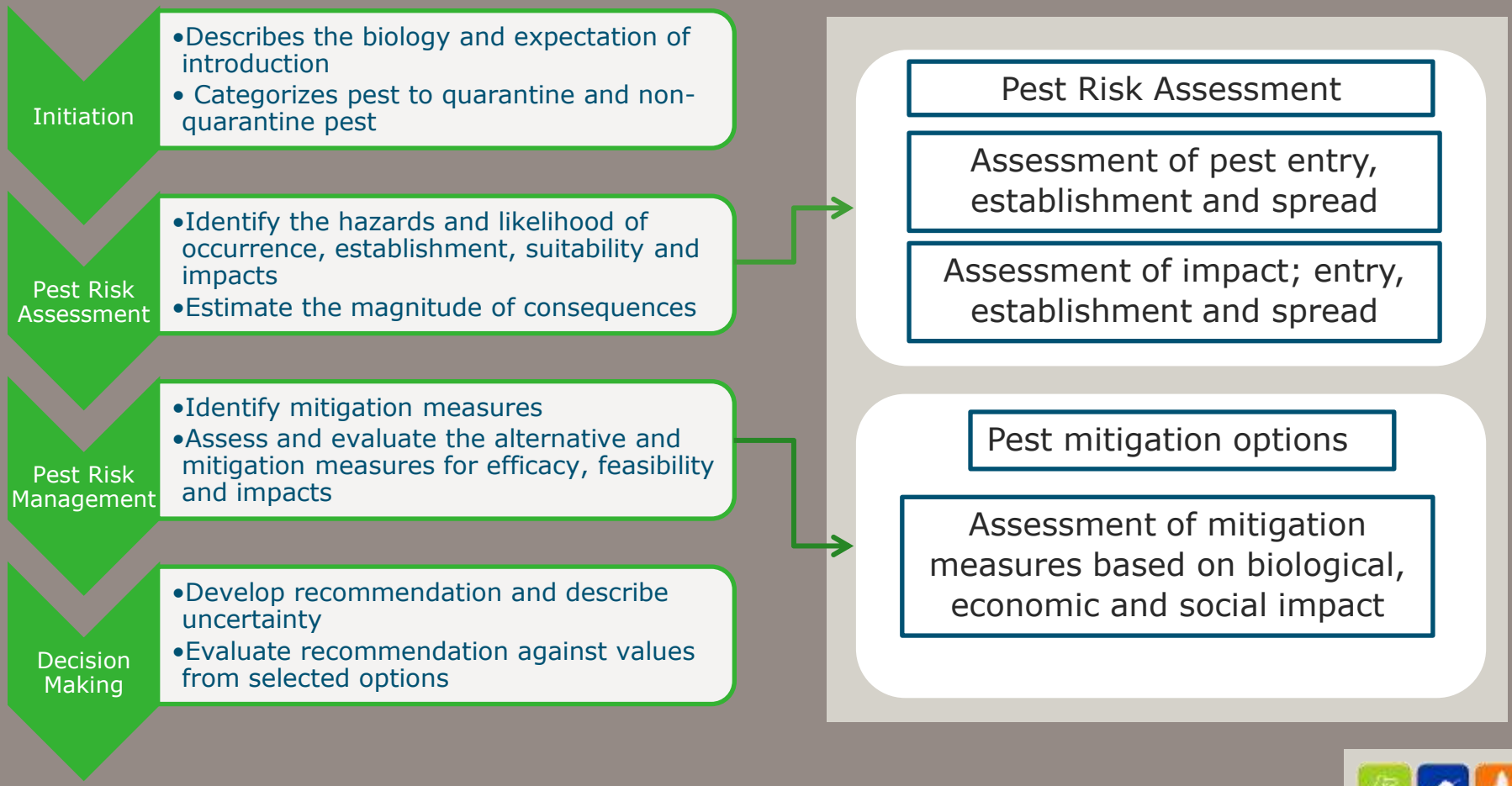
Outline of the Presentation

- Background of the Pest Risk Analysis
  - Impact Assessment tools in PRA
  - Appraisal Tools used in PRA and its limitations/gaps
- Integrated Impact Assessment
  - Generic Framework used variety of ways
  - IIA in the PRA
  - Methods for integration
- Challenges and Issues;

Impact Assessment in PEST RISK ANALYSIS (PRA)



Appraisal Tools in the PRA

- Step 3 of the PRA uses appraisal tools to assess biological, economic and social impacts.
- Lack of comparative measurements across the appraisal tools.
- Three individual impact assessment tools are disconnected, and might result to opposing recommendations; not to a balanced evaluation.

Integrated Impact Assessment (IIA)

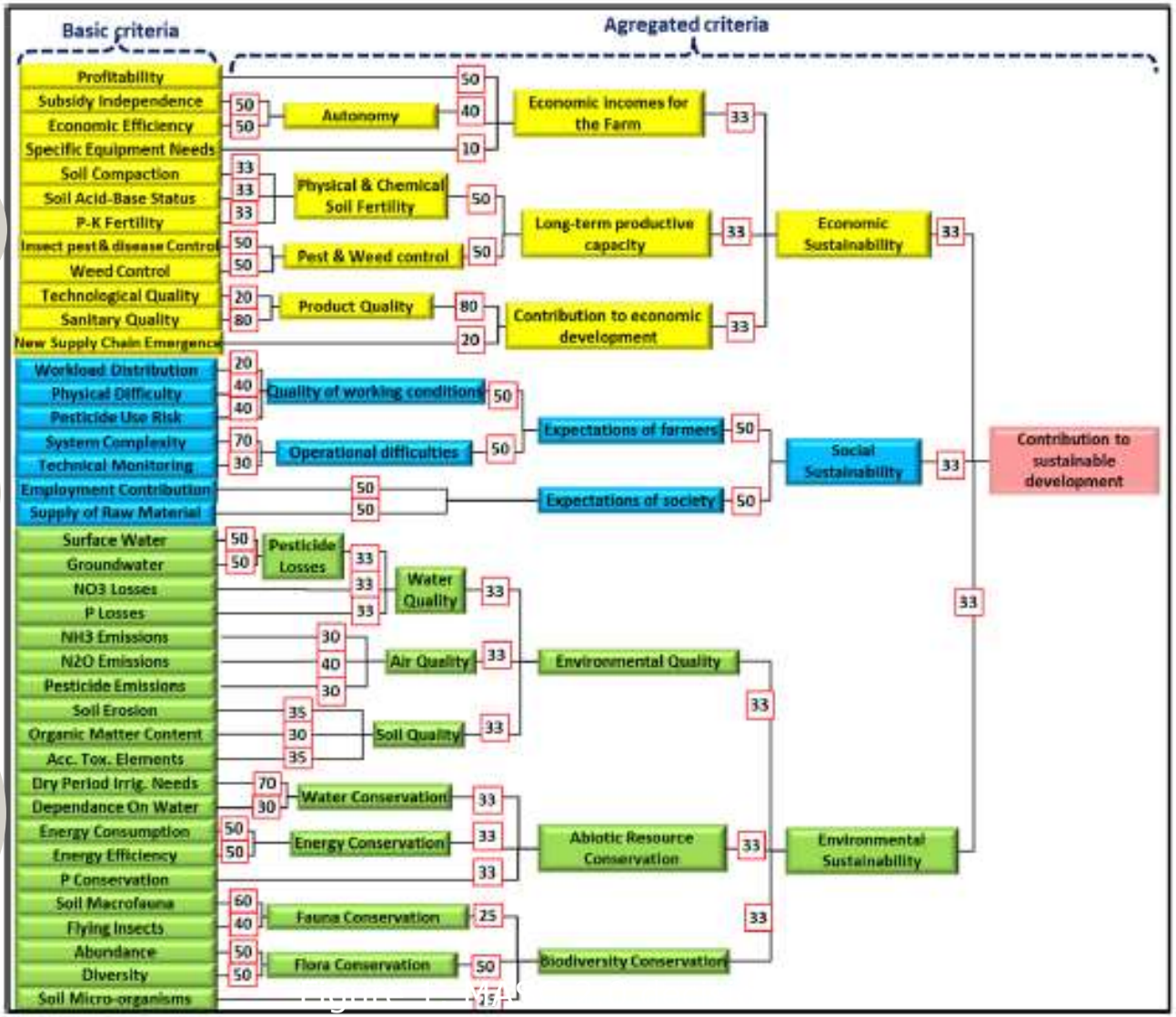
- **Integrated impact assessment** is a systematic and hierarchal approach to predict the overall impact of a project.
  - Use in plant health: assess the impacts among three complex systems using appraisal tools in an balanced manner.
  - Allows results from appraisal tools to be compared against each system, general overview of the trade-offs.
  - Assess mitigation measures by an overall integrated score.

How it works?

Complex decision problems are deconstructed into systems

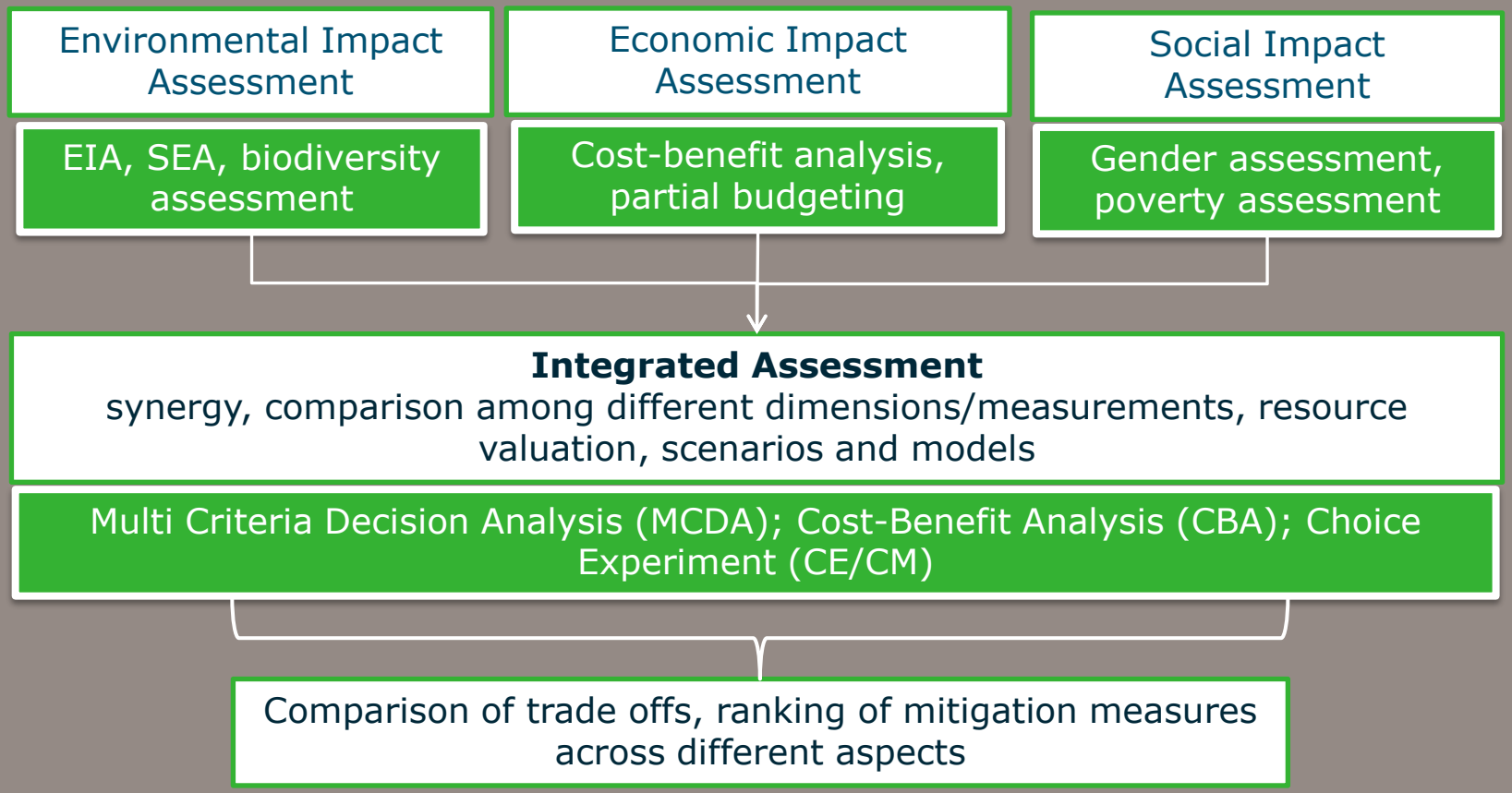
Decomposition into smaller less complex problems, called attributes

Attributes are organized hierarchically and takes values from a corresponding scale/weights



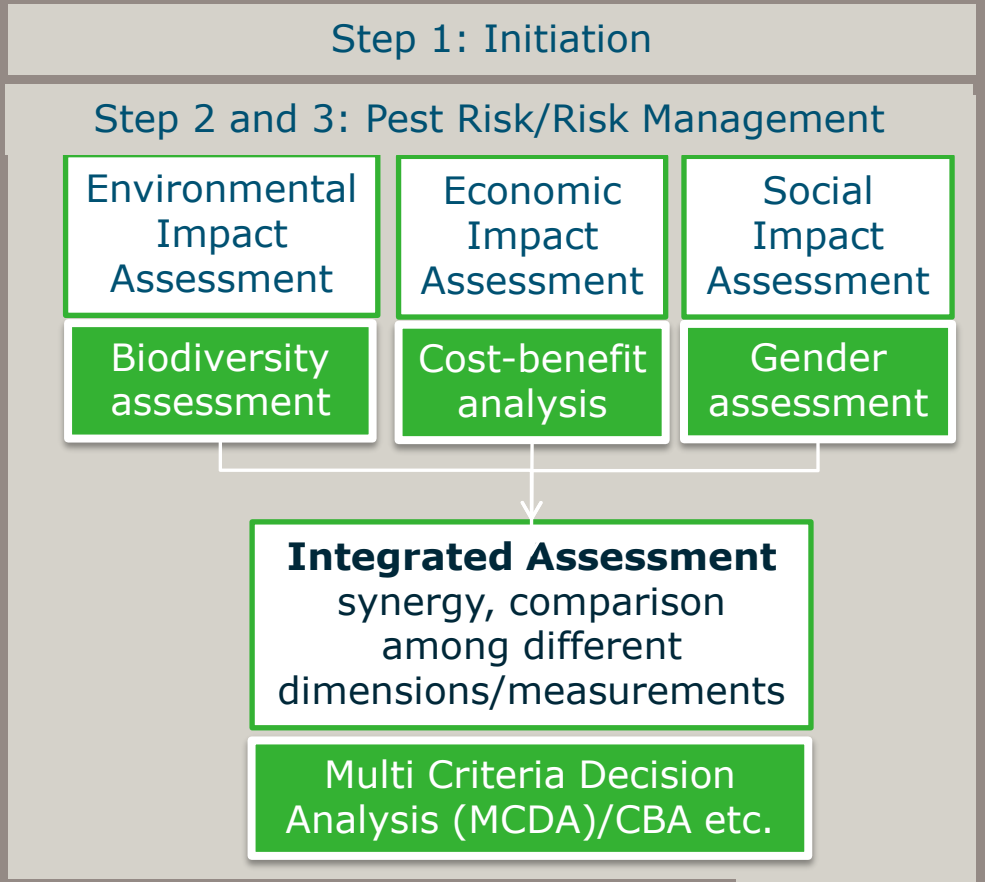
Craheix et al, 2012)

Generic Framework for Integrated Impact Assessment (IIA)



Integrated Impact Assessment in Pest Risk Analysis

- Improve the recommended integration methodologies in integration in Step 3 of the PRA.
- Use IIA in both Step 2 (*pest risk assessment*) and 3 (*risk management*)
- Propose to use MCDA methods to integrate impacts which cannot be monetized



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PRA Development with IIA

PRA Existing Practices

Initiation
- Describes the biology and expectation of introduction
- Categorizes pest to quarantine and non-quarantine pest

Pest Risk Assessment
- Identify the hazards and likelihood of occurrence, establishment, suitability and impacts
- Estimate the magnitude of consequences

Pest Risk Management
- Identify mitigation measures
- Assess and evaluate the alternative and mitigation measures for efficacy, feasibility and impacts

Decision Making
- Develop recommendation and describe uncertainty
- Evaluate recommendation against values from selected options

Proposed PRA Process

Pest Category (regulated/non-regulated organism)

Environmental Impact Assessment

Economic Impact Assessment

Social Impact Assessment

Integrated Assessment
Multi Criteria Decision Analysis (MCDA)

Evaluate recommendation against values from selected options

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- Development of a framework for assessing effects of invasive species on ecosystem services.
- Integrated assessment of environmental, social and economic sustainability
- Development of scientifically sound and fit for purpose quantitative methods for assessing impact, cost and benefits of risk mitigation option.

FRAMING ISSUE

Objective 1. Review methodologies and frameworks to integrate environmental, economic and social impact of emerging pest and pathogens in the European Union.

Design Protocol

Objective 2. Develop framework which would integrate environmental, economic and social impact on affected sites and recommend suitable measurements and indicators.

Case Studies

Execution/Implementation

Objective 3. Assess the impact of pathogens and pests using suitable multi-criteria decision making tool which would ensure that mitigation measures are environmentally sustainable, economically and socially equitable.

Stage 1: Pest Category (regulated/non-regulated organism)

Step 2 and 3: Pest Risk/Risk Management

Environmental Impact Assessment

Economic Impact Assessment

Social Impact Assessment

Integrated Assessment
Multi Criteria Decision Analysis (MCDA)

Decision Making: Evaluate recommendation against values from selected options

Pests of POnTE

Xfs

CaLSol

Phy

Hp

Objective 4. Recommend protocol requirement and framework for a dynamic decision making tool to estimate the environmental, economic and social impact to aid policy making.

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Challenges and Issues for proposed Integrated Impact Assessment

- Evaluation of social impacts
- Which indicators to score? Whose preference matter?
- Extent to generalize among categories of pests.
- Testing applicability to assess pest and mitigation measures on *Xylella fastidiosa (Xf); Candidatus* Liberibacter *solaneauns (CaLSol), Phytophthora spp. (Phy)* and *Hymenoscyphus fraxineus* (Hp).

End of Presentation

Thank you for listening!

Looking forward to your comments.

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Tools and Methodologies for Integration

- Appraisal tools- **Environmental Impact Assessment** (EIA/SEA), **Economic Impact Assessments** and **Social Impact Assessment** (SIA) have been criticized to be too independent of each other;
- **Cost-benefit Analysis** (CBA) popular tool to monetize benefits and costs.
- **Conjoint Analysis** is a multi attribute model used to determine the value of different attributes based on individual preference
- **Multi Criteria Decision Analysis** (MCDA)is an umbrella term for methods which has been used to address complex problems, integrate sustainability indicators, different form of data from biophysical and socioeconomic systems (Qin et al, 2007).

MCDA for Integrated Impact Assessment in PRA

- Analytical Hierarchy Process (**AHP**) – have been used in EIA to solve complex multi-dimensional process; it captured perception of stakeholders on relative severity of different socioeconomic impacts (Ramanatan, 2001)
- Preference Ranking Organization Method Enrichment Evaluation (**PROMETHEE**)- an outranking method for limited set of alternatives among selected and often conflicting criteria (Brans et al 1986)

MCDA for Integrated Impact Assessment in PRA

- Multi-attribute utility theory (**MAUT**) – aims to attain an aggregated measure of utility of each outcome within a set of alternatives/options. (Würtenberger, et al. 2005)
- Elimination and choice translating reality (**ELECTRE**) – Uses discrete choice criteria and orders alternatives.
- It chooses alternatives that are preferred over most criteria (Pohekar and Ramachandran, 2007)