as endangered species risk assessment have benefited from these developed methodologies coupled with available geoinformation on use sites, species information and protected areas. The intent of this presentation is to bring perspective to where we are today, and to put some of the current conference discussions into a broader historical context.

Christopher Topping
Aarhus University
Speaker

Christopher Topping is Professor MSO in Ecological Modelling at Aarhus University, Denmark. He has been working with modelling environmental impacts of primarily agricultural practices and agricultural policy affecting wildlife management and risk assessment for over 20 years. His primary field is development and testing of complex multi-faceted agent-based models (ABMs), leading towards simulation of social-ecological systems and the use of models for wildlife management and environmental risk assessment of agricultural chemicals, crops, and practices. He is a member of the EFSA Plant Protection Products and Residues Panel (PPR) and has been involved in EFSA working groups since 2009.

Landscape scale simulation for terrestrial population modelling and ERA

Landscape-scale simulation modelling considers multiple farm to regional scales. Simple landscape representations have been used in population modelling since 1980s but over the last decade much more detailed models have become available that can explicitly represent details of agricultural systems necessary to include when developing landscape scale population models for ERA. For these models the key focus is development of the baseline against which pesticide induced changes can be compared. These must represent a realistic population resiliance to perturbation as well as spatio-temporal dynamics. A number of these detailed models have been developed using the ALMaSS framework and applied to ERA. The results of these simulations indicate that a re-prioritising of factors considered in traditional risk assessment is needed to take into account both population and landscape levels. Factors that have an important bearing on the outcome of landscape ERA include the effect of ‘action at a distance’, the spatial configuration of landscapes, the importance of toxicity, species specific population ecology, the scale considered, and the general context dependency of the ERA on landscape conditions. This context dependency is a challenge, but also provides a clear indication of the direction in which landscape-scale ERA needs to develop. This development is aided by advances in landscape scale data collection and integration. Large landscapes can already be easily and quickly generated for Denmark from standard GIS data, suggesting that generally applicable models for large areas of Europe may not be far off.

Andreas Focks
Alterra, Wageningen UR
Speaker

Andreas Focks works in mechanistic modelling and statistical analysis of the effects of chemical stressors on the biotic environment, at levels of individuals, populations and communities. He has worked since 2013 as ecological modeller at the research institute Alterra, as part of Wageningen University and Research Centre in the Netherlands. He was amongst others involved in the EU MarieCurie ITN CREAM, and the CEFIC-LRI–financed project ChimERA. Currently, he works mainly on toxicokinetic-toxicodynamic modelling of chemical effects in a programme of the Dutch government, on the modelling and detection of chemical effects at community levels within the EU 7th framework project Solutions, and on the development of integrated exposure and effect models at landscape scales in connection with the definition of ecological scenarios. Since 2008, Andreas has (co-)authored 24 papers in peer reviewed journals.

Towards a landscape scale risk assessment: development of a coherent and flexible framework for the integration of exposure and effect modelling[1]

Chemical fate and ecological modelling approaches allow for the linking between exposure and effect dynamics in space and time and hence for the spatially explicit, landscape-level quantification of risk in aquatic and terrestrial systems. In the future, landscape scale approaches could be adopted to supplement higher tier regulatory assessment for pesticides in the EU to make environmental risk assessment of chemicals more relevant and realistic.

At the same time ecological models are proposed to support experiment-based environmental risk assessment for a set of application areas. Examples of integrated approaches at landscape scales exist in the literature, but are scarce and of an ad-hoc nature (i.e. they do not derive their approaches from

[1] Andreas Focks, Hans Baveco, Jos Boesten, Louise Wipfler and Paul J. Van den Brink.

generic integration principles for risk assessments). The lack of a common understanding and a reference framework impedes further development and harmonisation of integrated exposure and effect modelling approaches.

In this presentation we will present some ideas about possible improvement of current risk assessment. A concept for a framework for landscape-scale integrated exposure and effect modelling will be outlined. An example for such integrated modelling approach will be shown, and it will be indicated how the collection of landscape-scaled data in geographical information systems can support such modelling approaches by providing scenario information. An outline will be given on how spatial landscape elements can be evaluated in their effect on the in situ risk of compounds by the use of landscape scale modelling approaches, hence linking from risk assessment to risk management, or from prospective risk assessment to post-registration monitoring.

Alberto Pistocchi
Joint Research Centre (JRC)
Speaker

Alberto Pistocchi has a Master in Philosophy, a Master in Environmental Engineering and Land Planning and a PhD in Georesources engineering and Geotechnologies from the University of Bologna, Italy. He is an associate professor of Land Planning, a chartered civil/environmental engineer and the author of several scientific publications. Since gaining his PhD, he has been one of the founders of GECOsistema srl, Italy, an SME providing solutions for spatial decision support systems in the field of environmental assessment. He has been the coordinator of masterplans for the regional river basins of Emilia Romagna, Italy, and a consultant in water engineering, environmental assessment and land planning, before joining the European Commission's DG Joint Research Centre where he has worked on the development of methods for GIS-based chemical fate and transport modelling and risk assessment. He presently serves as a project manager and quantitative policy analyst on integrated water resources assessment and the management of river basins.

Landscape and climate parameters for the mapping of pesticides ERA

The JRC produces or makes use of a broad array of spatial data concerning landscape and climate characteristics at the European scale, and beyond. These encompass weather and climate parameters, soil characteristics, topography, hydrography, land cover and human activities to which pesticide emissions can be associated.

In this contribution, we briefly review the data requirements of a spatial environmental risk assessment (ERA) of chemicals, the extent to which such requirements are, or can be, fulfilled, and the main gaps hampering a broader take-up of spatial ERA. We stress how spatial ERA aims at producing a more realistic picture of risks taking into account both the variability of exposure to chemicals, and the superposition of multiple chemicals emitted from different sources. We discuss how the different data gaps may hinder one or both aims, and propose some considerations on priorities in data collection, sharing and the trade-offs between model complexity and usability considering the ERA objectives.

Jose V. Tarazona
European Food Safety Authority (EFSA)
Speaker

See bio p.3

Coupling science and regulatory needs: Towards the integration of ecological and landscape diversity in prospective environmental risk assessments

Addressing the diversity of environmental and ecological conditions has always been a challenge in environmental risk assessments. For pesticides, where the risk is linked to the intended conditions of use under good agricultural practices, the complexity is increased by the variability in the agricultural landscape conditions. Traditionally, this diversity has been covered by the identification of "realistic worst-case conditions" or the use of "representative scenarios". The verification of these conditions and scenarios, e.g. getting evidence supporting the assumption that the conditions are worst-case and the scenarios representative, requires a significant effort of data collection and information processing, and has been the main challenge for decades. Recent technological developments have facilitated the collection, integration and use of massive amounts of data, including spatial information. These developments open the door for a new conceptual approach: instead of worst-case conditions or few scenarios, the environmental assessment could cover the full geographic area and landscape conditions where the pesticide is expected to be used; the information could then be aggregated according to the risk managers' needs: e.g. zones and conditions were low risk is expected without restrictions, zones and conditions where mitigation measures or restrictions are needed, and finally zones and conditions where the identified risk cannot be sufficiently controlled by mitigation measures.