
Anticipation of the mitigation hierarchy at a land use planning scale: framework proposal at the knowledge--action boundary

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Abstract

Habitat loss, degradation, and fragmentation due to artificialization represent perhaps the most immediate and tangible threats to biodiversity due to their effects on species diversity and persistence. In this context, in many regions of the world, policy to ensure a "No Net Loss" (NNL) of biodiversity in the face of development projects primarily involves a mitigation hierarchy in which impacts are treated in three ways: they can be "avoided", unavoidable impacts can be "reduced", and residual impacts "offset". This mitigation hierarchy has received criticism in terms of its environmental efficiency, social implications and ethical basis and its all too common dependence on offsetting. The posture taken by stakeholders is more reactive than pro-active, and the absence of a large and systematic planning-scale approach within which measures for each of the three elements of the mitigation triptych is also increasingly claimed. In fact, currently, mitigation measures are proposed during "environmental impact assessment", the main tool for site specific planning and environmental management. Such environmental impact assessment represents a project by project ex--ante approach and remains a "localised" mitigation tool that currently do not reach the overall politic goal of NNL and that rarely befits from a systematic identification of conservation objectives.

Marked benefits to conservation could however be enhanced by adopting a large scale approach to planning for decision-making in the context of the mitigation hierarchy. Three main improvements are identified in this respect: a better identification of cumulative impacts of past, current and future projects, a favourable regional context in which to guide transparent and intelligible choices for the step of the mitigation hierarchy to be proposed, and information that gives higher flexibility in choices for offsets leading to better conservation action for priority biodiversity targets. Tools and concepts were developed in the discipline of systematic conservation planning. It aim at answering operational questions on how to select priority conservation areas can be adapted to different situation and can be used to select priority sites for the avoidance or the offsetting stages of the mitigation hierarchy.

The primary objective of this work is to develop an operational and effective framework, labelled "systematic mitigation planning" (SMP), that has the capacity to anticipate the whole mitigation hierarchy on a land-use planning scale. By means of a GIS approach,

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relevant for spatial and multi-criteria analyses, this framework aims at providing a methodological basis to alleviate (with a view to balancing) biodiversity losses by anticipation for avoidance of high priority biodiversity targets and the identification of priority sites for biodiversity offset measures. In this way, the framework attempts to maximize both the flexibility and effectiveness of mitigation hierarchy implementation and to limit conflicts between developers and conservation stakeholders. We use the systematic conservation planning concept as a basis through several stages, combine with landscape ecology principles. Finally, the framework proposes to guide decision-makers through a logical process of choices, identifying strategic questions prior to the implementation of a mitigation hierarchy in each particular project. We test this framework with the Montpellier Metropolitan territory's agency in the South of France, and currently working on the urban development plan for the territory.

Finally, It is worth noting that mitigation hierarchy and NNL objective are principles dealing with conservation but created first by politics. It was then analysed by scientists. Indeed, the founding principle of these concepts raises new questions in conservation science. It also attests to the continued gap between practitioners needs and current scientific knowledge. As a result, knowledge is needed but this knowledge has to be practically relayed to practitioners. So, in light of existing observations and reflexions, we use this example to discuss the conditions, benefits and limits of this applied science and its effectiveness at the conservation / land-use planning interface.

Keywords: mitigation hierarchy, conservation science, land use planning, no net loss