

How modelling paradigms affect simulated future land-use change

GENERAL REMARKS

The revised paper has satisfactorily and competently addressed most of the comments I have provided on the original paper.

The merit of the paper is twofold. First, it raises awareness regarding the importance of modeling paradigms and other model assumptions in determining the results the models produce, necessitating their careful and situated interpretation and cautious use in making policy decisions. Second, by employing a systematic and focused comparison, it offers a comparative assessment of a top-down/aggregate with a bottom up/disaggregate model and discusses their relative worth and role in making decisions, despite the several open issues remaining for each modeling paradigm.

Moreover, the presentation and discussion of the models reveals the sensitivity of their results to the scenarios used and inputs from other models (see, e.g. section 2.2).

The authors are careful to underline the coarse level at which models operate and limits their application to offering broad indications of potential land use change under several socio-economic and climatic scenarios. They also discuss several open issues that may be addressed, but also may not be addressed, in the context of these modeling exercises.

A class of exogenous forces affecting land use change and may be probably tested at a coarse level concern disruptions owing to pandemics and major political events. These cause perturbations in labor supply, movement of people and products, tourism, etc. and may precipitate land use changes at a not-so-far future. It might be interesting to compare the aggregate and the disaggregate model predictions under these conditions to help further evaluate their overall significance.

Selected, mostly editorial, comments are offered below.

ABSTRACT

11-13

“In this study, we compare two pan-European land use models that are based on the same integrated modelling framework and utilise the same climatic and socio-economic scenarios, but which adopt fundamentally different modelling paradigms.”

It may be written more simply to avoid confusion:

“In this study, we compare two pan-European integrated land use models, that utilise the same climatic and socio-economic scenarios, but which adopt fundamentally different modelling paradigms.”

INTRODUCTION

41

“to guide models’ representation of human behavior”

“to guide the representation of human behavior in models” reads better.

58-59

“These previous comparisons reveal a major challenge: the shortage of models that take distinct approaches at similar geographical and thematic scales”

What is a thematic scale?

Did you want to write:

“These previous comparisons reveal a major challenge: the shortage of models that take distinct approaches at similar geographical scales and thematic areas”?

63

“Conceptual research suggests that...”

What is conceptual research?

69-71

“We use the term ‘modelling paradigm’ here to refer to a coherent methodological and theoretical approach, and specifically the ‘top-down’ and ‘bottom-up’ approaches frequently identified as paradigms in the literature (Brown, Brown, & Rounsevell, 2016; Couclelis, 2002).”

This sentence is unclear and confusing. Edit.

193-194

“We therefore also compare ecosystem service production levels, which account for exact forms of management simulated in each cell.”

How exact can be a simulation of a form of management in a 16kmX16km cell?

TERMINOLOGY

I suggest that instead of using the term ‘geographical’ to distinguish spatially disaggregate (spatially explicit) from aggregate analysis, the term ‘territorial’ is more suitable and supported by the fact that the spatially disaggregate estimates are using the NUTS classification scheme which is a territorial and not geographical scheme mainly.

In the same spirit, I suggest replacing the term ‘overall land use change’ with ‘aggregate land use change’.

The usage of these two terms – aggregate and spatially disaggregate (or, spatially explicit) – can be explained from the beginning and used consistently throughout the paper.

See some examples below.

3.1 Overall EU-level comparison

You can write it as: EU-level aggregate comparison

3.2 Geographical comparison

You can write it as: Territorial comparison

258

“Within the overall differences between model results exist some consistent spatial and geographical patterns (Fig. 4).”

I suggest replacing ‘geographical’ with ‘territorial’

Fig 4: Geographical differences ... I suggest using ‘territorial’ instead of ‘geographical’

311-312

“The consequences of top-down and bottom-up perspectives are apparent in the forms, extents, rates and patterns of land use change as the models respond to scenario conditions.”

Replace plural with singular number (form, extent, rate):

“The consequences of top-down and bottom-up perspectives are apparent in the form, extent, rate and patterns of land use change as the models respond to scenario conditions.”

343

“All of the models’ results” reads better as “All the results of the models”

404

“we can only make tentative conclusions”, rewrite “we can only draw tentative conclusions”

Table captions should be placed on the top (not bottom) of the Tables

Figure 1: Simplified **schematic** showing ... replace with

Figure 1: Simplified schema showing ...

Figure 3a: Supply levels of services that both models attempt to satisfy demand for, in each scenario. Edit

Similarly edit Figure 3b.

Appendix B: Full geographical scenario results

I suggest instead:

Appendix B: Complete territorial scenario results