

Comment on esd-2022-16

Anonymous Referee #2

Referee comment on "Governing change: a dynamical systems approach to understanding the stability of environmental governance" by Nusrat Molla et al., Earth Syst. Dynam. Discuss., <https://doi.org/10.5194/esd-2022-16-RC2>, 2022

This manuscript is a very welcome interdisciplinary contribution to Earth System Dynamics at both methodological and applied levels. Methodologically, it brings out solid dynamical systems approaches to addressing the highly nontrivial problem of environmental governance, where natural and human processes and interactions come into play that require not only the traditional dynamical systems principles in a sterile manner, but also social systems thinking with active decision making rather than the classical determinism. In this regard, this is a very insightful contribution that finds good grounds in an emerging but already reliable literature at the interface between natural and social systems with robust analytical mechanics principles and metrics (and dynamical systems in particular).

The stylised nature of the mathematical conceptualisations and experiments is crucial to shed light onto key interactions, with neither aiming at too much detail, nor at a too-macro of a picture that would wash out critical nonlinearities. As such, this is a very well balanced study, obviously with the inherent limitations that come with such exercise. The authors have done a pretty good job in laying down their reasoning so that it is clearly understood where things come from and what they are meant to represent.

However, it is important to further clarify to those readership that is perhaps not so familiar with one of either dynamical systems or governance reasoning the key notions being applied since aspects such as stability per se mean different things to different scientific communities. Further mathematical detail, while often discouraged in other venues, is never too much in this study, hence the authors are encouraged to add, perhaps in annex not to break the pleasant and clear flow of the text, further details on the underlying mathematical physics principles supporting their formal reasoning and formulation.

The conditions under which their formulations are applicable and not should also be further discussed with additional few sentences so that the more naive reader is not tempted to throw the models around without enough care. The authors were clearly

Careful and that is very well seen through the solidity of their argumentation, formulation, results and discussion. But an additional pedagogic little touch would be the cherry on top of the cake to further help the increasingly mathematically fragile geoscience readership and even more so those coming from the more social science side that might also be interested.

Last but not least, the remarks raised by the other referee are also hereby endorsed and will not be repeated. I would not say better in such regards.

All in all, this manuscript is definitely suitable for publication at Earth System Dynamics, is mostly appropriate at the scientific and technical levels save for the minor aspects raised by both of us, and would also benefit from providing an extra layer of clarification and caution so that a broader readership other than us more technically minded can actually appreciate better the value and harness the vast potential of this contribution.

Thank you and all the best.