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Conference Abstract

Simulation games to foster knowledge integration in transdisciplinary settings

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Abstract

Transdisciplinary research depend on arrangements between stakeholders from various spheres, including academics. It is considered as a way to enable taking account of the complexity inherent in the many interdependencies existing within a social and ecological system. Its implementation raises the question of the arenas in which fair and effective transitions can be discussed on a relevant scale, and of the tools that these arenas need. To this end, modelling approaches formally combine well with the participatory approaches that some governance models could include to meet the challenge of global sustainability (Di Vaio et al. 2021). Research and practice on participation engineering, and its analysis within a ‘policy analytics’ framework (Meinard et al. 2021), have highlighted the diversity of stages in a collective choice process and its revisions, and the need to take account of various forms of openness/inclusion at each of them. The engineering of participation, including in collaborative evaluation, is in full development, with proposals for tools for the various phases of the decision-making process, right from the design stage of a participatory approach (Hassenforder et al. 2016).

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In this presentation, we present and discuss the design and use of simulation games (Klabbers 2009) as a support for environmental living labs dealing with water governance issues. Simulation games are specific arrangements, gathering a group of people playing roles in predesigned situations and set of rules. Altogether this constitutes a model of a SES. In a following debriefing session, participants are requested to discuss the meaningfulness of the representation and the consequences that can be generated from the simulation (Meadows 2001, Ryan 2000).

We first present an example in Eastern Cape (South Africa) where a Living Lab has put to the front the issue of water equity and security and a game has been designed to handle this issue. Then we introduce the on-going experiment of designing a simulation game as a support to interactions within a Living Lab in Cevennes area in the South of France (site within Rhone basin LTER).

In order to investigate the relation between water security and water equity in the highly heterogeneous catchment of the Swartkops river in the Nelson Mandela Bay Metropolitan Area, we have designed and tested a serious game, WatEqS, that enables the simulation of coordination of uses of plurality of water sources for diverse users. It includes agricultural, industrial and domestic uses with social categories of domestic users, and one municipal water manager and one catchment resource manager. We represent both crucial stakes related to water security in this catchment: lack of water including for domestic uses, and poor sewage collection and treatment leading to serious consequences on local riverine and estuary ecosystems. Initial test of the game with representatives of the various communities represented in WatEqS has validated the suitability of the representation and provided initial insights on consequences of water security management on water equity. The interpretation of equity in this context is plural and seems to depend on water availability: between alleviating the most serious consequences of lack of water and equal distribution. In any case, the practice of the game facilitated discussion between communities and the municipality, each one being able to explain constraints of actions and understand the constraints of others.

The Living Lab currently set up in the Cevennes site of Rhone basin LTER builds on experience with Living Labs across the world. It focuses on those that aim at generating common understanding within social-hydrological dynamics to enable a further participatory set up of research agenda, such as those developed in the SDG Pathfinding project (Willaarts 2024). We refer to the ARDI method to design the game in a participatory way Etienne et al. 2011, in a first step of sharing knowledge between stakeholder from civil society organizations, policy making and private businesses sector, targeting to produce a tool for their further common exploration of possible futures of their place within water availability constraints.

Keywords

Lioving Lab; Simulation game; water governance

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Conflicts of interest

The authors have declared that no competing interests exist.

References

- Di Vaio A, Trujillo L, D'Amore G, Palladino R (2021) Water governance models for meeting sustainable development Goals: A structured literature review. Utilities Policy 72: 101255. [In English]. https://doi.org/10.1016/j.jup.2021.101255
- Etienne M, R. D, Pollard S (2011) ARDI: a co-construction method for participatory modeling in natural resources management. Ecology and Society 44 (1). [In English]. URL: http://www.ecologyandsociety.org/vol16/iss1/art44
- Hassenforder E, Pittock J, Barreteau O, Daniell K, Ferrand N (2016) The MEPPP framework: a framework for monitoring and evaluating participatory planning processes. Environmental Management 57 (1): 79-96. [In English]. https://doi.org/10.1007/s00267-015-0599-5
- Klabbers JH (2009) The magic circle: Principles of gaming & simulation. SENSE Publishers, Rotterdam. [In English].
- Meadows DL (2001) Tools for understandings the limits to growth: comparing a simulation and a game. Simulation and Gaming 32 (4): 522-536. [In English]. https://doi.org/10.1177/104687810103200408
- Meinard Y, Barreteau O, Boschet C, Daniell KA, Ferrand N, Girard S, et al. (2021) What is policy analytics? An exploration of 5 years of environmental management applications. Environmental Management 67 (5): 886-900. [In English]. https://doi.org/10.1007/s00267-020-01408-z
- Ryan T (2000) The Role of Simulation Gaming in Policy Making. Systems Research and Behavioral Science 17: 359-364. [In English]. https://doi.org/10.1002/1099-1743(200007/08)17:43.0.CO;2-S
- Willaarts B, et al. (2024) *SDG pathfinding methodological framework: Participatory Approach to Localise the Sustainable Development Agenda. IIASA. Belmont Forum Project Report "SDG Pathfinding: Co-creating pathways to sustainable development in Africa". URL: https://pure.iiasa.ac.at/id/eprint/20174/