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Data and Services for Spatial Sustainability Science

The Story of the new IOER Research Data Centre

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Abstract. The emerging research data centre (RDC) at the Leibniz Institute of Ecological Urban and Regional Development (IOER) constitutes an essential milestone towards promoting sustainable land transition and transformative urban and regional development. The IOER RDC leverages spatial data science and artificial intelligence to process and analyse diverse and complex data sources. It provides high-resolution indicator maps of land use, ecosystems, and settlement structures, as well as cross-scale and cross-disciplinary spatial analyses, modelling, and simulations. Moreover, the IOER RDC offers digital tools to support decision-making, policy planning, and sustainable transformations. Hence, the IOER RDC has the potential to foster a sustainable future by facilitating the transition towards sustainable land use and development in urban and regional areas. The IOER RDC's endeavours offer a path towards addressing pressing societal challenges, such as rapid urbanisation, environmental degradation, climate change, and social inequality.

Keywords: Research Data Centre, Spatial Data Science, Sustainable Transformation

Transformative RDC for urban and regional development

Establishing the Leibniz Institute for Ecological Urban and Regional Development (IOER) new research data centre (RDC) is a significant milestone towards supporting sustainable land transition and transformative urban and regional development. The starting point of the IOER RDC is the RatSWD-accredited geospatial research data infrastructure "Monitor of Settlement and Open Space Development (IOER Monitor")", which has been operating since 2009 [1]. The IOER RDC aims to provide essential spatial data, analysis, and digital tools that enable interdisciplinary research, support policy and planning practices, and aid decision-making for spatial sustainability transformations to happen [2], [3], [4]. The IOER RDC activities respond to pressing societal challenges, including rapid urbanisation [2], environmental degradation [3], climate change [4], and social inequality [5]. To address these issues, the IOER RDC focuses on spatial data science and artificial intelligence to process and analyse heterogeneous data sources, make sense of complex spatial relationships and dynamics, and visualise the results in an accessible way. The centre provides high-resolution indicator maps on land use, ecosystems, settlement structures, building stocks, cross-scale and cross-disciplinary spatial analyses, modelling, and simulations. The IOER's RDC is committed to achieving its goals by reconstructing historical developments, describing the current status quo, and presenting alternative spatial scenarios to evaluate possible future development paths. Additionally, the IOER RDC will also develop and provide digital tools that support decision-making for sustainable transformations. These tools should help policymakers and planners understand the po-

tential impacts of different development scenarios, identify trade-offs, and make informed decisions that support sustainable urban and regional development. Data literacy is paramount in contemporary society, and the IOER RDC recognises its significance. The centre aims to improve data literacy by making data and information more accessible and comprehensible. The centre will organise regular training and collaborative educational events, workshops, and webinars to enhance the thematic data literacy of researchers, policymakers, and planning practitioners. Moreover, interdisciplinary cooperation and knowledge exchange will be facilitated between research areas, political decision-makers, and planning practitioners. The IOER RDC actively participates in national and international research data infrastructure initiatives, including NFDI4Biodiversity, NFDI4Earth, KonsortSWD, BERD@NFDI and NFDI4memory. The centre's involvement in these initiatives includes contributing to pilot projects, case studies and incubators to develop innovative solutions and data products. Its involvement is expected to generate enduring impacts in developing a robust and sustainable research data infrastructure ecosystem that will benefit various stakeholders. The IOER RDC's interdisciplinary approach focuses on spatial data science and dedication to improving competence in understanding and performing knowledge generation during the societal shift to digital culture. Overall, establishing the IOER RDC represents a significant advance towards helping sustainable land use transition and transformation in urban and regional areas and a positive step towards building a sustainable future.

Data availability statement

This submission is not based on data or any related material.

Author contributions

Ramona Voshage: Conceptualisation, Writing – review & editing, Project administration

Sujit Kumar Sikder: Writing – review & editing

Stefano Della Chiesa: Writing – original draft, Writing – review & editing

Tobias Krüger: Writing – review & editing

Martin Schorcht: Writing – review & editing

Gotthard Meinel: Conceptualisation, Funding acquisition, Project administration

Competing interests

The authors declare that they have no competing interests.

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