



Putting sufficiency into practice

Transdisciplinary sufficiency research in urban development: The *Hafen-Ost* real-world laboratory in Flensburg, Germany

The evaluation of real-world laboratories is crucial. Since not only successes but failures and obstacles can provide information about the conditions for transformation, it is appropriate to also examine difficulties in a methodologically guided way.

Michaela Christ , Jonas Lage , Bernd Sommer , Johanna Carstensen, David Petersen , Maike Böcker , Levke Mahrt , Henning Brüggemann, Claudia Takla Zehrfeld

Putting sufficiency into practice. Transdisciplinary sufficiency research in urban development: The *Hafen-Ost* real-world laboratory in Flensburg, Germany
GAIA 33/S1 (2024): 26–34

Abstract

The port in Flensburg, Germany, has shaped the city's identity. Globalisation and deindustrialisation have seen the northern German port on the Baltic Sea lose its economic importance. The city of Flensburg is currently planning to build a new district on a huge redevelopment site. The idea is to create a district with an infrastructure that promotes and enables lifestyles that use resources and land sustainably. The real-world laboratory on sufficiency-oriented urban development described and evaluated here aimed to better understand the process of implementing sufficiency policies and their effects, and to develop the knowledge and skills needed for sufficiency-oriented policymaking. The real-world laboratory is a collaborative project between members of the city administration and academics from the Europa-Universität Flensburg. The evaluation shows both the difficulties of putting sufficiency policies into practice and their potential for sustainability.

Keywords

real-world laboratory, sufficiency, sufficiency policy, sustainability assessment, urban development, urban planning

In the spring of 2016, the administrative mayor and treasurer of the city of Flensburg, Germany, highlighted a specific issue to researchers from the Norbert Elias Center for Transformation Design and Research at Flensburg University. He explained that the city was facing increasing pressure from its rising population and a steady increase in the level of individual consumption. The combined effect was pushing Flensburg to the limits of its physical and geographical growth. As a common practice by many local authorities (Hahne and Al Samarraie 2020), Flensburg had for some years sold off land in the form of plots and properties to attract new taxpaying residents and businesses to finance and provide public infrastructure and services. Consequently, space in the city had become scarce, desirable, and expensive. The mayor posed the question of what could be done to leave this unsustainable trajectory.

This conversation marked the start of a transdisciplinary research project on sufficiency-oriented urban development that included the creation of a real-world laboratory (RwL) focusing on policy measures to reduce space consumption.¹

¹ The research and development project *Opportunities and Obstacles for Sufficiency-Oriented Urban Development (EHSS)* was funded by the German Federal Ministry for Education and Research (BMBF) from 2017 to 2023. The authors were part of the transdisciplinary research team.

Dr. Michaela Christ (corresponding author) | Europa-Universität Flensburg | Norbert Elias Center for Transformation Design & Research (NEC) | Flensburg | DE | michaela.christ@uni-flensburg.de

Jonas Lage | Europa-Universität Flensburg | Norbert Elias Center for Transformation Design & Research (NEC) | Flensburg | DE and TU Dortmund University | Dortmund | DE | jonas.lage@uni-flensburg.de

Prof. Dr. Bernd Sommer | Europa-Universität Flensburg | Norbert Elias Center for Transformation Design & Research (NEC) | Flensburg | DE and TU Dortmund University | Dortmund | DE | bernd.sommer@tu-dortmund.de

Johanna Carstensen | City of Flensburg | Flensburg | DE | carstensen.johanna@flensburg.de

David Petersen | Europa-Universität Flensburg | Norbert Elias Center for Transformation Design & Research (NEC) | Flensburg | DE | david.petersen@uni-flensburg.de

Dr. Maike Böcker | Europa-Universität Flensburg | Norbert Elias Center for Transformation Design & Research (NEC) | Flensburg | DE | maike.boecker@uni-flensburg.de

Levke Mahrt | Europa-Universität Flensburg | Norbert Elias Center for Transformation Design & Research (NEC) | Flensburg | DE | levke.mahrt@uni-flensburg.de

Henning Brüggemann | City of Flensburg | Flensburg | DE | brueggemann.henning@flensburg.de

Claudia Takla Zehrfeld | City of Flensburg | Flensburg | DE | takla-zehrfeld.claudia@flensburg.de

© 2024 by the authors; licensee oekom. This Open Access article is licensed under a Creative Commons Attribution 4.0 International License (CC BY).
<https://doi.org/10.14512/gaia.33.S1.5>

Received May 19, 2023; revised version accepted January 18, 2024 (double-blind peer review).

According to current research, sufficiency, together with efficiency and consistency, is an essential strategy for achieving sustainability goals (IPCC 2022). However, while efficiency and consistency strategies have become commonplace, sufficiency is still rarely adopted in politics (Böcker et al. 2021, Zell-Ziegler 2021). When sufficiency is taken into account, it is often done by appealing to individuals to change or adapt certain practices. The call by German politicians to change heating and showering practices to save energy in the winter of 2022/2023 can serve as a prime example of this phenomenon. Policies aimed at putting sufficiency into practice on a collective, rather than an individual level, receive much less attention (Schneidewind and Zahrnt 2014). The implementation of sufficiency policies is associated with specific problems. As sufficiency focuses on reducing consumption and production of end-use products and services through social innovation, it is (to some extent) at odds with a growth-oriented society and economy, as well as with the corresponding routines of governance, everyday practices, and ways of thinking (Princen 2005).

After undertaking literature-based research on urban sufficiency and its obstacles (Stadt Flensburg 2021) and carrying out a qualitative interview study with local authorities in other cities (Böcker et al. 2022), we started an RwL in Flensburg, Germany. A redevelopment area, where there are plans for the construction of a new urban quarter, was the subject of the RwL. The task was to guide and support the planning and redevelopment process. The aim was to contribute to the creation of a neighbourhood with infrastructure aimed at fostering and enabling lifestyles that use the resources and land in a sustainable way. Now, several years after the RwL's inception, this article is part of the co-evaluation process. The aim of this paper is twofold. Firstly, following the scheme of Luederitz et al. (2017) we want to better understand the RwL's processes and reflect on its achievements, as well as on the resources used. We examine the following questions: How has the perspective of sufficiency-oriented urban development affected the planning framework? Which processes were advanced or impeded by this? Which transformative knowledge and practices in politics, academia, and administration were developed in the context of the RwL process? Secondly, this paper aims to contribute to the further development of the evaluation scheme. We propose to add an additional dimension to the framework, which will help to reflect systematically on the failures and obstacles of the RwL, as they also provide knowledge about the conditions for transformation.

Conceptual background

Sufficiency in urban development

We define sufficiency as a strategy for reducing the consumption and production of end-use products and services through changes in social practices to comply with environmental sustainability, while still ensuring an adequate social foundation for all people. This definition captures the quantitative dimension

of sufficiency (Jungell-Michelsson and Heikkurinen 2022, Lage 2022) and the need to reduce consumption and production levels in countries in the Global North (Haberl et al. 2020). The focus on changes in social practices emphasises the fact that consumption and production practices are interconnected with material, institutional, and cultural framework conditions. Consequently, we also relate to notions of sufficiency that emphasise the importance of incorporating sufficiency strategies into policymaking (Lage 2022, Spangenberg and Lorek 2019).

Since the early 2010s, the perspective of sufficiency has gained some attention in urban planning (Tenberg and Vogel 2017, Deutscher Städtetag 2021) and research (ARL 2023, Brokow-Loga and Eckhardt 2020, Böcker et al. 2020). Sufficiency in urban planning attempts to satisfy diverse needs by redistributing what already exists, as opposed to supporting further growth. This usually implies reducing private spaces in favour of strengthening public spaces (Böcker et al. 2022). Examples include the creation of infrastructure that shortens travelling distances, reduces car use and the living space per capita through shared use or downsizing to smaller apartments. The sufficiency perspective is often associated with urban planners (although they do not use the term sufficiency) such as Gehl (2010), Jacobs (1992) and Sennett (2018) through their focus on densification, redistribution, and public spaces.

Real-world laboratories and their evaluation

Real-world laboratories (RwLs) are collaborative platforms that bring together stakeholders from various sectors to address complex sustainability challenges in real-world settings (Schneidewind and Zahrnt 2014). Rogga et al. (2018) define an RwL as a model in which evidence-supported solutions can be tested and adjusted, and societal progress can be achieved. Therefore, RwLs are designed to integrate scientific knowledge, local knowledge, and practical experience to generate innovative solutions that are feasible, effective, and socially acceptable (Kampfmann et al. 2023). A transdisciplinary team of researchers, practitioners, and stakeholders from different disciplines and sectors work together to identify problems, co-produce knowledge and social practices, and jointly evaluate their impact (Beecroft et al. 2018, Schöpke et al. 2018). One or more real-world experiments are conducted in RwLs.

Empirically tested approaches to the evaluation of RwLs are rare (Kampfmann et al. 2023). Research and practice in RwLs is still a young branch of transdisciplinarity (Beecroft and Parodi 2016). Following Luederitz et al. (2017), an ideal-type of evaluation of an RwL experiment would 1. define a goal, 2. create an appropriate set-up, 3. measure the effects, 4. evaluate the effects against sustainability criteria, and 5. develop evidence-supported policy recommendations. However, such an evaluation scheme is limited by the complexity of the multi-dimensional structure of RwLs. Many processes take place concurrently, a variety of actors from diverse backgrounds and different institutions are involved, and the social context changes continuously (Kampfmann et al. 2023). Furthermore, the evaluation encompasses different



© Thomas Raake

FIGURE 1: The *Hafen-Ost* site from the air in Flensburg, Germany. The area covers 53 hectares and is the location for a future new urban district. A real-world laboratory examined the potential for sufficiency-oriented urban development at this site.

dimensions with specific restrictions and requirements, like the RwL's sustainability effects, the implementation process, and the extent of capacity-building within the transdisciplinary team.

The *Hafen-Ost* real-world laboratory

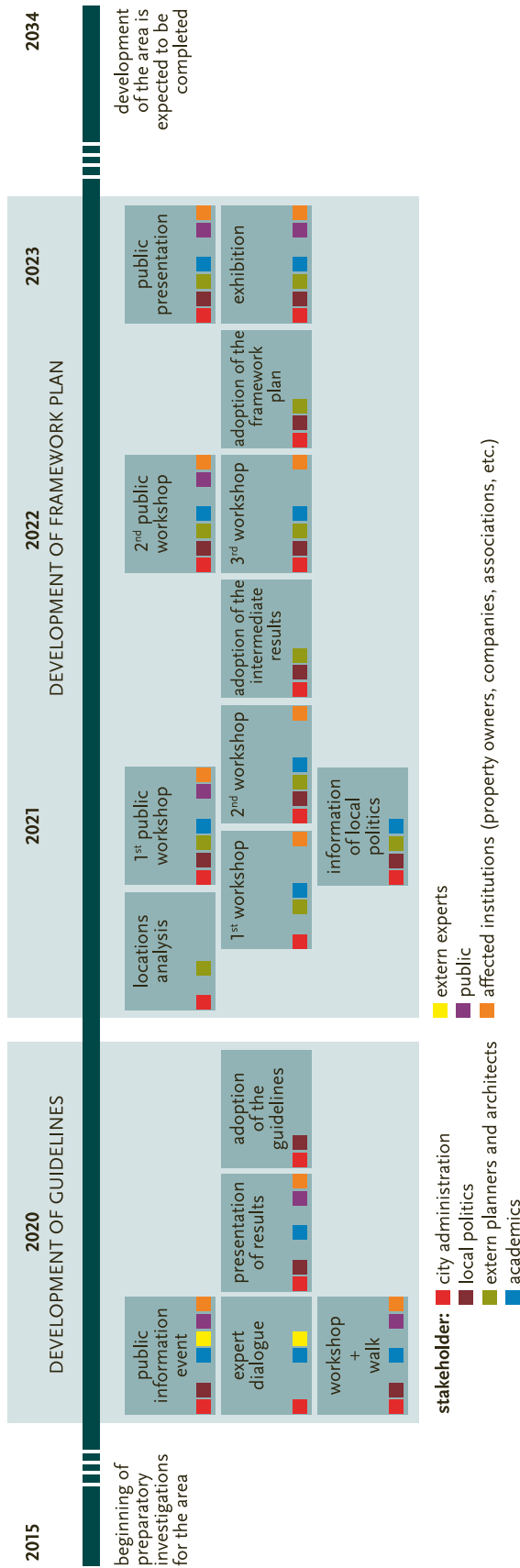
The RwL evaluated here is located in *Hafen-Ost*, which means "harbour on the east side"; a redevelopment area of the industrial harbour in Flensburg, in northern Germany, where a new urban district for 2,500 inhabitants is to be created. The port has shaped Flensburg's history and identity. For centuries, Flensburg's location on the Baltic Sea, with its trading port and access to a major transport route, were key factors for the prosperity of the city. In common with many other port cities, the port lost its economic importance through deindustrialisation and globalisation. The redevelopment area covers 53 hectares. It encompasses some limited active port industry, an industrial wasteland (used by locals to hang out, listen to music or skateboard), a sailing club, and a few enterprises, such as a building materials retailer, a carpentry business, and a small shipyard (figure 1). In 2015, following several years of discussion, local politicians voted in favour of conducting preparatory studies to determine the ar-

ea's development potential (IHR Sanierungsträger 2019). In 2019, our transdisciplinary team conducted research on the potential for sufficiency-oriented urban development and the associated barriers. When it became clear that a new urban district was to be built on the development site, we decided to make this the subject of our RwL.

The RwL was divided into two parts. In 2020, eight guidelines for the sufficiency-oriented development of *Hafen-Ost* were created through a participatory process; these gained political agreement (Stadt Flensburg 2020). Subsequently, the second part of the project started in 2021. The aim was to help translate the sufficiency strategy into concrete planning, starting with the framework plan for the new urban district, *Hafen-Ost* (Stadt Flensburg 2023).

The *Hafen-Ost* project meets the main characteristics of an RwL (Schäpke et al. 2018). It shows transdisciplinarity through the productive collaboration between researchers and practitioners. The project aims to describe urban problems related to the scarcity of land, and to develop and test concrete practices of sufficiency-oriented land use, thus demonstrating how transformation processes can be implemented. Furthermore, the project's normative orientation is evident through its use of the concept of sufficiency as a strategy for sustainability. The proj-

FIGURE 2: The timeline of the real-world laboratory (RwL) process and the stakeholders involved in the participatory process, including urban planners, local administration, politicians, academics, and the public. The redevelopment of *Hafen-Ost* is a long-term, ongoing project that started more than a decade prior to the inception of the RwL and will continue for more than a decade after the RwL.



ect has an experimental nature because the local administration has decided to explore and test new methods of cooperative planning and land ownership. The planning process was created as a model that could be expanded to cover the entire town and transferred to other cities. The redevelopment of *Hafen-Ost* is a long-term project (figure 2). But, to some extent, the long-term orientation limited the possibilities for co-development because certain decisions had already been made (e.g., the initial decision to redevelop the area). Finally, both the guidelines and the framework plan for the new urban district, *Hafen-Ost*, were developed through participatory processes, including workshops with various stakeholders, public hearings, and informative walks through the district (figure 2). According to Arnstein’s ladder of participation (Arnstein 1969), the chosen participatory formats fall into the categories of informing, consulting, placating, and to some extent, partnering.

Material and method

In recent years, several frameworks for evaluating RwLs have emerged (Williams and Robinson 2020, Molas-Gallart et al. 2021, Kampfmann et al. 2023). To evaluate the *Hafen-Ost* RwL, we build on the evaluation scheme put forward by Luederitz et al. (2017).² By focusing on four dimensions, the evaluation scheme includes perspectives on both direct output and broader transformative outcomes. It not only considers the sustainability effects, but also the built capacities and changes to the discourses and cultures. This broad and comprehensive perspective distinguishes the scheme by Luederitz et al. (2017) from other evaluation schemes and makes it applicable to different case. This means it can be applied to experiences and learning from different RwLs (Doyon et al. 2020, Piani et al. 2021). The Luederitz et al. (2017) scheme is unique in that it is robust to contextual specificities, covering the resources required for the specific process, while facilitating generalisation and theory building.

The evaluation of the RwL is based on different types of material. In order to collect and synthesise the knowledge and perspectives within the transdisciplinary team, we conducted a survey (approximately 20 pages) among the eleven members of the transdisciplinary team and discussed the results in an internal workshop. The questionnaire and discussion were based on the scheme by Luederitz et al. (2017; the questionnaire is provided as an online supplement³). The results of the survey (examined with a content analysis) and the workshop formed the main source for our evaluation. Additionally, we analysed our research diaries that were written during the research project (approximately 120 pages). Consequently, the results mainly reflect the perspective of the transdisciplinary research team.

2 For a different perspective on the Luederitz et al. (2017) evaluation scheme, Guittard et al. (2024, in this issue) apply this framework on three multi-actor labs in coastal, rural regions.

3 <https://doi.org/10.14512/gaia.33.S1.5.suppl>

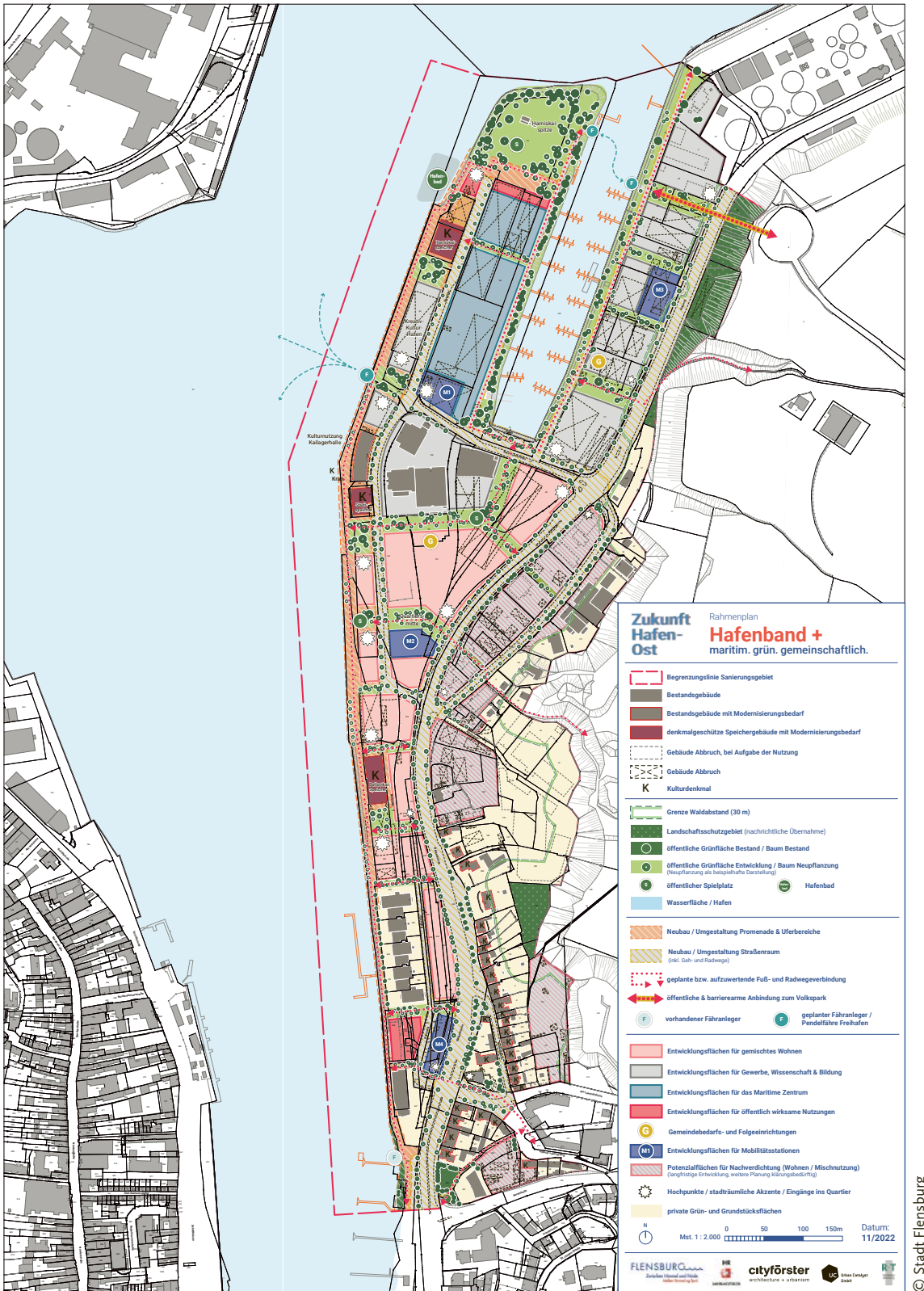


FIGURE 3: The framework plan for the Hafen-Ost district in Flensburg, Germany, was developed by a team of urban architects, and mobility and green space planners between the summer of 2021 and December 2022 (City of Flensburg 2023). The planning process was accompanied by various participatory events and scientific research, as part of the real-world laboratory.

Results

We have found Luederitz et al.'s (2017) framework to be a fruitful heuristic for evaluating and discussing RWLs. It allows for a differentiated analysis according to the four dimensions of output, outcome, process, and input. This perspective is useful because during an RWL, impulses and impacts can be observed on these different levels. While some RWLs may perform particularly well at the outcome level (e.g., reduction of CO₂ emissions), others may show strengths in the process dimension (e.g., by achieving broad participation of relevant stakeholders). Due to the peculiarities of the *Hafen-Ost* development, our RWL showed different qualities with regard to the four dimensions (e.g., most of the results are expected in the future). The Luederitz et al. (2017) scheme enabled a systematic evaluation of different levels of the *Hafen-Ost* RWL in terms of its contribution to sustainability, as well as an integration of different perspectives. For each dimension, the findings are summarised in key points, based on the material and discussions described above.

Output: What was generated?

The integration of sufficiency as a politically controversial sustainability strategy in a large-scale urban development project is unique and experimental, and offers valuable insights for the socio-ecological transformation of cities. However, the interventions of the RWL tended to be directed towards the governance and planning processes, rather than being physical interventions in the urban space.

The most visible output is the framework plan for the new neighbourhood (figure 3). The planning document defines the functions and uses that should be included in the development area – where and how. For example, it specifies where and what kind of mobility infrastructure to provide, where to locate the housing, and where to establish businesses, as well as specifies which existing buildings to retain and which to demolish. The framework plan was designed by a team of urban, green space, and mobility planners, supported by members of the sufficiency research group. The aim was to create a plan for a neighbourhood where people could live and work, using as little space and as few resources as possible. The plan is for a mixed-use neighbourhood with a strong emphasis on public uses. This goal draws attention to two important everyday practices that consume space: housing and mobility. As a result, the living space is calculated based on an average of 30 square metres per person (e.g., the Flensburg average is 44.7 square meters, and the national average is 47.7 square meters per person). In compensation, the plan includes spacious public green spaces of high quality. In terms of mobility, the plans clearly favour sustainable modes of transport and discourage car use. The access road to the neighbourhood is reduced from four to two lanes. There is no parking in public spaces, except for people with reduced mobility and for delivery traffic. Parking is only available in decentralised neighbourhood garages at the edge of the neighbourhood, which also serve as bike and car rental and repair stations. On the other

hand, there is a well-developed bus service and a good network of paths for pedestrians and cyclists. The plan does include other sufficiency indicators but these two – the number of cars and the average living space per person – are crucial in that they determine how much space is available for public use.

At the outset of the project, sufficiency was largely an unknown concept. At the initial public events, the idea of trying to achieve sustainability through changes in behaviour and resource use was met with clear criticism. For example, reducing living space per capita was described as “living in a henhouse”, and the idea of a car-free neighbourhood was viewed as absurd and unrealistic. Criticism of this kind reduced in later events, and the demand for greater sustainability increased. It is impossible to judge whether this indicates that the project convinced the public, or whether the critics avoided subsequent events. Many actors, at least in the political discourse, adopted the concept of sufficiency in their linguistic usage, both positively and negatively. While national media coverage of the project tended to be positive, local media remained largely critical.

A third output is the adoption by the city council of two legal land policy instruments (*Konzeptvergabe* and *Erbbaurecht* in German), which are intended to help reduce land consumption and give politicians and local authorities more influence over the type and extent of use and design of land and property, without themselves taking on the role of developer or investor. The political decision was taken to apply both legal instruments to the municipal land and buildings in *Hafen-Ost*. This means that they will not be sold, but only leased for a period of several decades. Specific uses and conditions can be laid down in binding contracts.

Outcome: What was accomplished?

Luederitz et al. (2017) characterize outcome as the results achieved in terms of sustainability. This is defined as the extent to which the changes achieved support sustainability, contribute to intergenerational and intragenerational justice, minimise resource use, and promote socio-ecological responsibility and democratic governance.

On the last point, one outcome from the project corresponds to what Schneidewind and Singer-Brodowski (2013) call transformative literacy within the team and other project participants. This refers to the integration of different forms of knowledge with the aim of developing skills to change social conditions to improve sustainability. The different approaches taken for the participatory development of the guidelines and the framework plan for *Hafen-Ost* is an example of evolving transformative literacy. The intention was to involve the public and different stakeholders in the development of both the guidelines and the framework plan. In comparison to the development of the guidelines, the development of the framework plan included significantly more offers aimed at the target groups. The first public event concerning the development of *Hafen-Ost*, from which the policy guidelines emerged, was aimed at a general audience. Later events on the framework plan were better adapted – in terms of

content and organisation – for different target groups (e.g., stakeholders from the sphere of politics, civil society, the real estate industry, the local authority, and users of the area). This resulted in more detailed and targeted communications, which helped to integrate local knowledge and capabilities, as well as the needs and wishes of present and future inhabitants and users into the framework plan. In this way, the RwL provided an opportunity to experiment with and strengthen different forms of participatory governance, thus promoting collaborative decision-making processes with different actors.

Framework plans are usually informal planning documents with a loose binding character. They form the basis for more concrete development plans. This is not the case in Flensburg. The plan was adopted by the city council in a political resolution after extensive and controversial discussion (figure 3). However, a framework plan remains a plan. The same applies to the guidelines. It is not yet possible to predict to what extent the sustainability goals that the documents set out and operationalise (e.g., reducing land consumption) will actually be implemented and result in built sustainable urban infrastructure. In the spring of 2023, there was an intense public and political debate about the costs and consequences of relocating the port, which is a prerequisite for implementing the framework plan. Rising prices in the construction and energy sectors, combined with changes in the political sphere (notably the election of a new mayor), have reignited the discussion about the whole development.

Processes: How was it completed?

What contributed to the identified outcomes and outputs? In retrospect, the RwL consisted of a long series of internal project meetings, workshops, a field trip, and site visits with various stakeholders, as well as public events. These were designed to facilitate ongoing transdisciplinary exchange among project staff, the development of new processes in and with the local authority, the planning and preparation of extensive participation formats with different stakeholders, peer learning (e.g., in workshops with guests from other municipalities), the securing of what had been developed through political decisions, as well as the public discussion of urban sufficiency measures in *Hafen-Ost* and beyond. The events and meetings did not follow an overall predefined plan but were oriented to the project and process-specific requirements. There were two guiding principles: on the one hand, the attempt to focus on the desired output (i.e., a framework plan that operationalises resource-saving living in urban development and its necessary preconditions) and, on the other hand, the flexibility to respond to local and time-specific problems.

Input: What was invested?

“Inputs are contributions to and investments in the experiment of transition to sustainability, including awareness, commitment, experience, trust, and financial and other types of support” (Luederitz et al. 2017, p. 73). The municipality of Flensburg initiated this transdisciplinary collaboration. The project would not have

existed without the financial support of the German Federal Ministry of Education and Research (BMBF) for the research project, which amounted to approximately 900,000 Euros over a period of almost six years, mainly for staff costs and, to a lesser extent, material costs. In addition, all the project staff, as well as many of the administrative and redevelopment staff, contributed a great deal of time (often unpaid), work, energy, commitment, and creativity to the project. The ability to tolerate frustration was necessary when concrete, short-term economic or political interests pushed the comparatively abstract sustainability goals into the background.

The project received a great deal of attention because it was supported and endorsed by the administrative board. Accordingly, there was considerable experience of local government and knowledge of local history. Mutual trust between project partners was an important resource, especially in conflict situations: for example, when researchers were perceived as lecturing or “know-it-alls”, or when researchers had the impression of being instrumentalised by the municipality. There were also disagreements about goals and procedures, which could not always be resolved. Good cooperation depended on awareness of the different system logics, temporalities and dependencies between the administration, politics, and science. Trust does not develop automatically. At the outset of the project, the researchers signed a confidentiality agreement in which they promised to treat internal administrative information confidentially. In return, this allowed them deep insights into administrative and political processes: for example, through participation in planning rounds and internal discussions.

Discussion and conclusion

It is not yet clear how sufficient the new neighbourhood will be. The framework plan contains several elements that will allow for a sufficiency-oriented urban development. However, the implementation of the plan will continue to be shaped by all kinds of interests (e.g., depending on funding and investors). Furthermore, the full potential of sufficiency policies will not be realised within the plan due to financial, legal, technical, and political difficulties. Some of the barriers are local and, therefore, difficult to transfer to other projects. Others reflect wider societal conditions. For example, in terms of sufficiency, the plan can be criticised for requiring the demolition and replacement of large parts of the existing building stock. In terms of energy use and sustainability, demolition or deconstruction of buildings is seen as a poor solution. There are several reasons for this, a key one being that demolition does not require planning permission – it is supported by government grants as part of the regeneration area. Forgoing this funding would be a financial risk for the city, especially as it is generally more difficult to find investors or developers willing and able to develop old and often dilapidated buildings rather than a brownfield site. The lesson here: the ability to take advantage of urban renewal policies is limited by, among

other things, the legal and economic framework that currently favours non-sustainability. To enable the reuse of existing buildings, it would be necessary to amend building regulations and provide financial support for the conservation of existing buildings.

This reflection on some obstacles to sufficiency, or unintended consequences of RwLs, points to a criticism of the output-outcome-process-input scheme proposed by Luederitz et al. (2017). “Each living lab is situated in a specific context with different characteristics in terms of, e. g., pertinent challenges, geography, and (political and social) room for manoeuvre. This means that an assessment framework needs to include options for appropriate contextualization and customization” (Bouwma et al. 2022, p. 6).

In relation to this statement, the scheme is wide enough to be applied to many different RwLs and, at the same time, offers enough concrete orientation through the guiding questions. However, following the solution orientation of transdisciplinary research, in general, and that of RwL, in particular, the scheme focuses primarily on the conditions for successful RwL and less on obstacles to sustainability or unintended consequences. It seems useful to examine difficulties in a methodologically guided and systematic way as part of an evaluation, as not only successes but also failures and obstacles can provide knowledge about the necessary conditions for transformation.

In our RwL, for example, both the pandemic and the war in Ukraine shaped and changed the way in which administrators, politicians, and the public dealt with the development of the replacement area. A sudden shortage of resources and a shift in political priorities reignited the debate about whether the city could afford to build this neighbourhood and whether the relocation of the harbour, which was necessary to develop the neighbourhood, was appropriate.

In the *Hafen-Ost* RwL, we attempted to operationalise sufficiency within a mainstream framework planning process. This revealed the legal and financial parameters that need to be negotiated if less space is to be used and quality of life is not to be compromised. Based on these observations, we propose to add a fifth dimension to Luederitz et al.'s (2017) scheme, dedicated to the difficulties and hurdles in RwL processes. The objective is to assess the barriers to transformative projects, including financial, legal, technical, and political constraints. As described earlier this could facilitate a better comprehension of the socio-ecological transformation issues that exist and can be addressed at different levels of the political system.

In summary, our experience in the *Hafen-Ost* area demonstrates on the one hand that the implementation of sufficiency policies is a conflictual process of changing planning routines and infrastructures; on the other hand, the RwL shows that transdisciplinary research can help to put sufficiency into practice. More RwLs that do not reduce the implementation of sufficiency to a societal niche, but try to intervene in ongoing and long-term processes, could help to pave the way for mainstreaming sufficiency and contribute to scientific reflection on the implications and strategies for putting sufficiency policies into practice.

Acknowledgement: We would like to thank the German Federal Ministry of Education and Research for funding the research that led to this article. We would also like to thank two anonymous reviewers for their helpful comments.

Funding: Funding has been provided by the German Federal Ministry of Education and Research (BMBF; grant no. 01UR217004A4+AB+).

Competing interests: The authors declare no competing interests.

Author contribution: MC, JL: conceptualization, transdisciplinary design and reflection, writing – original draft, writing – review and editing; BS: writing – original draft; JC, MB, DP, LM, HB, CTZ: collected and contributed data. All authors provided critical feedback and helped shape the research, analysis, and manuscript.

References

- ARL (Akademie für Raumentwicklung in der Leibniz-Gemeinschaft). 2023. *Postwachstum und Raumentwicklung*. www.arl-net.de/de/postwachstum (accessed April 4, 2023).
- Arnstein, S. R. 1969. A ladder of citizen participation. *Journal of the American Institute of Planners* 35/4: 216–224. <https://doi.org/10.1080/01944366908977225>.
- Beecroft, R., O. Parodi. 2016. Reallabore als Orte der Nachhaltigkeitsforschung und Transformation. Einführung in den Schwerpunkt. *TATuP – Zeitschrift für Technikfolgenabschätzung in Theorie und Praxis* 25/3: 4–8. <https://doi.org/10.14512/tatup.25.3.4>.
- Beecroft, R., H. Trenks, R. Rhodius, C. Benighaus, O. Parodi. 2018. Reallabore als Rahmen transformativer und transdisziplinärer Forschung. Ziele und Designprinzipien. In: *Transdisziplinär und transformativ forschen*. Edited by A. Di Giulio, R. Defila. Wiesbaden: Springer VS. 75–99. https://doi.org/10.1007/978-3-658-21530-9_4.
- Böcker, M., H. Brüggemann, M. Christ, A. Knak, J. Lage, B. Sommer. 2021. *Wie wird weniger genug? Suffizienz als Strategie für eine nachhaltige Stadtentwicklung*. München: oekom.
- Böcker, M., J. Lage, M. Christ. 2022. Zwischen Deprivilegierung und Umverteilung. Suffizienzorientierte Stadtgestaltung als kommunales Konfliktfeld. *Soziologie und Nachhaltigkeit* 8/1: 64–83. <https://doi.org/10.17879/sun-2022-4309>.
- Bouwma, I., S. Wigboldus, J. Potters, T. Selnes, S. van Rooij, J. Westerink. 2022. Sustainability transitions and the contribution of living labs: A framework to assess collective capabilities and contextual performance. *Sustainability* 14/23: 15628. <https://doi.org/10.3390/su142315628>.
- Brokow-Loga, A., F. Eckhardt. (Eds.) 2020. *Postwachstumsstadt. Konturen einer solidarischen Stadtpolitik*. München: oekom.
- Deutscher Städtetag. 2021. *Nachhaltiges und suffizientes Bauen in den Städten*. Berlin: Deutscher Städtetag.
- Doyon, A., T. Moore, S. Moloney, J. Hurley. 2020. Evaluating evolving experiments: The case of local government action to implement ecological sustainable design. *Journal of Environmental Planning and Management* 63/11: 2042–2063. <https://doi.org/10.1080/09640568.2019.1702512>.
- Gehl, J. 2010. *Cities for People*. Washington, D.C.: Island Press.
- Guittard, A. et al. 2024. Using multi-actor labs as a tool to drive sustainability transition in coastal-rural territories: Application in three European regions. *GAIA* 33/S1: 57–63. <https://doi.org/10.14512/gaia.33.S1.9>.
- Haberl, H. et al. 2020. A systematic review of the evidence on decoupling of GDP, resource use and GHG emissions, part II: Synthesizing the insights. *Environmental Research Letters* 15/6: 065003. <https://doi.org/10.1088/1748-9326/ab842a>.
- Hahne, U., J. Al Samarraie. 2020. Fläche als blinder Fleck. Transformationsdesign für die suffiziente Stadt. *RaumPlanung* 250/1: 30–39.
- IHR Sanierungsträger. 2019. *Flensburg Hafen-Ost. Vorbereitende Untersuchungen nach § 141 BauGB mit integriertem städtebaulichem Entwicklungskonzept*. www.ihrsan.de/fileadmin/Content/PDF_und_Images/Hafen-Ost/Bericht_vorbereitende_Untersuchungen_mit_integriertem_staedtebaulichem_Entwicklungskonzept.pdf (accessed January 18, 2024).
- IPCC (Intergovernmental Panel on Climate Change). 2022. Summary for policymakers. In: *Climate change 2022: Mitigation of climate change*. >

- Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Edited by P. R. Shukla et al. Cambridge, UK: Cambridge University Press. <https://doi.org/10.1017/9781009157926.001>.
- Jacobs, J. 1992. *The death and life of great American cities*. New York: Random House.
- Jungell-Michelsson, J., P. Heikkurinen. 2022. Sufficiency: A systematic literature review. *Ecological Economics* 195: 107380. <https://doi.org/10.1016/j.ecolecon.2022.107380>.
- Kampfmann, T., P. Bernert, D. Lang. 2023. Toward a modular evaluation approach of real-world laboratories: Findings from a literature review. *Research Evaluation* 32/1: 128–143. <https://doi.org/10.1093/reseval/rvac029>.
- Lage, J. 2022. Sufficiency and transformation – A semi-systematic literature review of notions of social change in different concepts of sufficiency. *Frontiers in Sustainability* 3. <https://doi.org/10.3389/frsus.2022.954660>.
- Luederitz, C. et al. 2017. Learning through evaluation – A tentative evaluative scheme for sustainability transition experiments. *Journal of Cleaner Production* 169: 61–76. <https://doi.org/10.1016/j.jclepro.2016.09.005>.
- Molas-Gallart, J., A. Boni Aristizábal, S. Giachi, J. Schot. 2021. A formative approach to the evaluation of Transformative Innovation Policies. *Research Evaluation* 30/4: 431–442. <https://doi.org/10.1093/reseval/rwab016>.
- Piani, L., M. Carzedda, N. Carestiatto. 2021. Food solidarity economy: Evaluating transition community initiatives in Friuli Venezia Giulia region. *Agricultural and Food Economics* 9: 32. <https://doi.org/10.1186/s40100-021-00203-6>.
- Princen, T. 2005. *The logic of sufficiency*. Cambridge, MA: MIT Press.
- Rogga, S., J. Zscheischler, N. Gaasch. 2018. How much of the real-world laboratory is hidden in current transdisciplinary research? *GAIA* 27/S1: 18–22. <https://doi.org/10.14512/gaia.27.S1.6>.
- Schäpke, N. et al. 2018. Jointly experimenting for transformation? Shaping real-world laboratories by comparing them. *GAIA* 27/S1: 85–96. <https://doi.org/10.14512/gaia.27.S1.16>.
- Schneidewind, U., M. Singer-Brodowski. 2013. *Transformative Wissenschaft*. Marburg: metropolis.
- Schneidewind, U., A. Zahrnt. 2014. *The politics of sufficiency: Making it easier to live the good life*. München: oekom. <https://doi.org/10.14512/9783865818911>.
- Sennett, R. 2018. *Die offene Stadt. Eine Ethik des Bauens und Bewohnens*. München: Hanser.
- Spangenberg, J. H., S. Lorek. 2019. Sufficiency and consumer behaviour: From theory to policy. *Energy Policy* 129: 1070–1079. <https://doi.org/10.1016/j.enpol.2019.03.013>.
- Stadt Flensburg. 2020. *Zukunft Hafen-Ost. Leitlinien für die Entwicklung eines nachhaltigen urbanen Quartiers*. Flensburg: Stadt Flensburg.
- Stadt Flensburg. 2021. *Wachstumstreiber und Suffizienzhindernisse auf kommunaler Ebene. Eine Untersuchung unter besonderer Berücksichtigung rechtlicher Aspekte*. Flensburg: Stadt Flensburg.
- Stadt Flensburg. 2023. *Logbuch. Kooperatives Verfahren zum städtebaulichen Rahmenplan Flensburg Hafen-Ost*. Flensburg: Stadt Flensburg.
- Tenberg, B., A. Vogel. 2017. *Strategie für klimaschonende Entscheidungen*. Münster: Stadt Münster.
- Williams, S., J. Robinson. 2020. Measuring sustainability: An evaluation framework for sustainability transition experiments. *Environmental Science and Policy* 103: 58–66. <https://doi.org/10.1016/j.envsci.2019.10.012>.
- Zell-Ziegler, C. et al. 2021. Enough? The role of sufficiency in European energy and climate plans. *Energy Policy* 157: 112483. <https://doi.org/10.1016/j.enpol.2021.112483>.



Michaela Christ

PhD in sociology. Since 2013 researcher at the Norbert Elias Center for Transformation Design & Research at the Europa Universität Flensburg, DE. Since 2023 team leader at the German Institute of Urban Affairs (difu), Berlin, DE. Research interests: socio-ecological transformation, sufficiency, urban sustainability, mobility.

GAIA Masters Student Paper Award

The international journal **GAIA – Ecological Perspectives for Science and Society** invites Masters students to participate in the **2025 GAIA Masters Student Paper Award**.

Masters students are encouraged to submit their results from research-based courses or from Masters theses in the field of transdisciplinary environmental and sustainability science.

Submission guidelines and more information:

www.oekom.de/zeitschriften/gaia/student-paper-award

Deadline for submission: November 25, 2024.

The winner will be selected by an international jury and will be granted a prize money of EUR 1,500 endowed by the Selbach Umwelt Stiftung and Dialogik gGmbH, as well as a free one-year subscription to GAIA, including free online access. The winner may also be encouraged to submit his or her paper for publication in GAIA.

DIALOGIK
gemeinnützige Gesellschaft für Kommunikations- und Kooperationsforschung mbH

Selbach Umwelt Stiftung

GAIA