Urban Planning
2025 • Volume 10 • Article 9873
https://doi.org/10.17645/up.9873

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Open Access Journal

Local Implementation of the 2030 Agenda in Europe

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Submitted: 15 January 2025 **Accepted:** 9 June 2025 **Published:** 10 September 2025

Issue: This article is part of the issue "Future Urban Sustainability: Lessons Learnt from the SDGs and Perspectives for a Post-2030 Agenda" edited by Florian Koch (HTW Berlin), Sarah Beyer (HTW Berlin), Kerstin Krellenberg (University of Vienna), and Julia Wesely (University of Vienna), fully open access at https://doi.org/10.17645/up.i433

Abstract

While some scholars see the Sustainable Development Goals (SDGs) as an example of environmentally friendly development approaches that reconnect development with biospheric preconditions, others argue that they mask ongoing contestation. This article begins with a multi-level governance perspective on the "green goals" of the 2030 Agenda and the importance of local action for their implementation. The focus is on Europe, where municipal sustainability governance was found to be concentrated and where the environment is most likely prioritized. Against this backdrop, I analyze which policy measures the European Union, nation states, regions, and municipalities in Europe name in the reviews submitted to the UN High-Level Political Forum to achieve environmental targets. I show that although the environment is not a priority of SDG implementation at any policy level, municipalities are occasionally leading the way in environmental action both horizontally, with site-specific measures, and vertically, with multi-level measures.

Keywords

2030 Agenda; biodiversity; environmental sustainability; implementation; municipalities; Sustainable Development Goals; voluntary local reviews

1. Introduction

A "popular leitmotif" has emerged according to which "cities, not states, are best equipped to deal with complex problems such as climate change" (Bansard et al., 2017, p. 230). The 2030 Agenda not only includes Sustainable Development Goal (SDG) 11 on "Sustainable cities and communities," but local and regional governments play an important role in achieving implementation of the entire agenda (Kosovac & Pejic, 2023). While there is a broad body of literature on the role of cities and local governments with regard to climate action (SDG 13; see e.g., Bansard et al., 2017; Cilliers, 2021), this article aims to extend this debate

to other "green goals," which address the protection of water (SDG 6), oceans (SDG 14), and biodiversity (SDG 15). The aim is to provide a list of measures that are "concrete and feasible" (Elder, 2024, p. 8). At the same time, the article highlights the ongoing contestation of compliance across multiple levels of governance. Are municipalities really leading the way in implementing the "green" SDGs?

With the High-Level Political Forum, UN member states have created a body that is mandated to orchestrate the SDGs' implementation. Each nation-state government committed to submitting so-called Voluntary National Reviews (VNRs) for this. In addition, the European Union (EU) submitted a review, and also several regions and municipalities are publishing Voluntary Local Reviews (VLRs), where they report their progress on the SDGs' implementation (UN, 2025). Municipalities in Europe are over-represented in municipal sustainability networks and are expected to most likely prioritize the environment (Bansard et al., 2017; Elder, 2024). The analysis of the reviews and semi-structured interviews with experts involved in the writing process serves to identify the policy actions taken and hence the importance given to the environmental targets at the municipal level compared to the regional, national, and EU levels. The next section introduces a multi-level governance perspective on the 2030 Agenda and the importance of local action for its implementation. After a more detailed explanation of the methodological approach, the results of my analysis of the reviews submitted by all municipalities in Europe and the policy units above them are presented (total: 50 reviews). In addition, interviews with municipal representatives, consultants, and researchers on the importance of "green goals" for the VLRs were conducted (total: 10 interviews).

I show that there are a number of policy measures that municipalities can take. The more local, the more precise policy measures are. Although the environment is not a priority at any level, municipalities occasionally lead the way in environmental action both horizontally, with site-specific measures, such as green spaces and the renaturation of water bodies, and vertically, with multi-level measures, such as sustainability criteria for public procurement and fair trade.

2. A Multi-Level Governance Perspective on the "Green Goals" of the 2030 Agenda

The SDGs were formulated in an international arena; however, they must be implemented within domestic boundaries. The environment is a central point of contestation in this process (Partzsch, 2023; Randers et al., 2019). The 2030 Agenda takes up the Brundtland Commission's three pillars concept: The preamble states that the SDGs are "integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental" (UN, 2025). In the implementation process, however, the bigger picture is being overlooked, namely that "environmental sustainability needs to be prioritized because it is a precondition for economic and social sustainability" (Elder, 2024, p. 8). In this vein, Sachs (2017, p. 2576) calls for a "mental rupture" in the sense that a new prioritization should overcome an understanding of development as economic industrialization.

SDG 6 "Clean water and sanitation," SDG 13 "Climate action," SDG 14 "Life below water," and SDG 15 "Life on land" are commonly defined as the "green goals" (Rockström, 2021). Each of these goals is directly connected to SDG 11 "Sustainable cities and communities" through the sub-targets (see Tables 2–5). Target 11.1 includes access to basic services, which comprise clean water and sanitation. Target 11.6 aims to generally reduce the adverse per capita environmental impact of cities, including air quality and waste management, and target 11.4 attempts to protect and safeguard the world's natural heritage. Access to open

and green spaces for all, the aim of target 11.7, concerns diverse green goals. Target 11.5 mentions "water-related disasters," and target 11.b refers to the Sendai Framework for Disaster Risk Reduction. Further environmental areas include sustainable transport (target 11.2), and sustainable urbanization and sustainable human settlement planning and management (target 11.3; UN, 2025).

Municipalities are increasingly recognized as key actors in global sustainability governance and key sites of implementation. They have the ability to implement sustainability measures more directly, as their remit often covers areas of responsibility such as housing, water management, and urban planning, to name a few (Clement et al., 2023; Kosovac & Pejic, 2023). Local and regional governments are responsible for almost 60% of total public investment in Europe (OECD, 2020, p. 19). Against this backdrop, Barber (2014) most prominently argued that local (city) leaders should replace national leaders as key international interlocutors and decision-makers. Many transnational municipal and regional networks demonstrate what he defines as "glocality" by connecting cities and regions globally, especially in their fight against climate change. The C40 Cities Climate Leadership Group and the Covenant of Mayors are well-known examples (Kosovac & Pejic, 2023).

Scholars argue that the often progressive policies of cities offer a dynamic and pragmatic alternative to the morass of international politics and geopolitical struggle in countries of the global North, like in Europe, where municipal sustainability governance is concentrated (Bansard et al., 2017; Hickmann, 2021). At the same time, localizing the SDGs is a complex process that requires effective municipal governance (Krellenberg et al., 2019). For the national level, scholars observe a tendency of "cherry-picking" (Forestier & Kim, 2020). Similarly, instead of prioritizing the green SDGs, smart city strategies are found to be most relevant for SDG 7 (energy access), SDG 8 (economic growth), and SDG 9 (infrastructure), along with SDG 11 (Clement et al., 2023). In contrast to the euphoria expressed towards the local level, municipalities themselves have been found to generally lack the capacity, legal authority, and competence to implement many of the changes needed to promote sustainable development (Kosovac & Pejic, 2023).

A new form of municipal reporting, the VLRs, has gained considerable prominence in recent years (Ciambra, 2021). In contrast to the VNRs, for which nation-state governments committed to submitting at least two versions before 2030, VLRs are completely voluntary, have no official status, and follow no guidelines. However, the UN publishes these reviews on a special website. In addition, several projects collect data on the local implementation of the SDGs, by asking communities to provide data on the indicators originally defined for nation-states (for example, Bertelsmann Foundation provides a portal for Germany, see https://sdg-portal.de/en). So far, in this and other contexts, there are mostly isolated debates for each policy field (Partzsch, 2023). The local level provides a solid foundation for comparing the prioritization of the environment in the implementation processes between levels, as the interconnectedness of goals and targets becomes most visible at the local level (see also Clement et al., 2023; Stockmann & Graf, 2022). Local governments may use VLRs mostly symbolically to justify business as usual, or they may indeed lead the way in implementing the SDGs in a manner that prioritizes the green goals and hence accepts that environmental sustainability is a precondition for economic and social sustainability.

3. Methods

My analysis focuses on Europe, as scholars found municipalities in countries that are the "historic emitters" to be well represented among pioneers for climate action (Bansard et al., 2017, p. 242), and environmental

sustainability policies are perceived to be more concrete here than elsewhere (Elder, 2024, p. 9). Thus, as European municipalities provide the best cases in the sense of being the most likely to prioritize the environment and to take crucial policy measures, I used the full sample of VLRs submitted to the High-Level Political Forum by European municipalities for my study. The UN database includes a total of 52 VLRs from 39 municipalities in Europe, which submitted VLRs at irregular intervals between 2019 and 2023 (https://sdgs.un.org/topics/voluntary-local-reviews). Twenty-six municipalities published one VLR, five municipalities two VLRs, and four municipalities three VLRs. Only Ghent submitted four VLRs (status: June 2024). In order to obtain a representative sample, only the most recent VLRs for each municipality and those in English were included, resulting in a total of 36 VLRs.

Once the VLRs were identified, the relevant reports from the higher levels were downloaded. Three of the sampled municipalities are located in the region of North Rhine-Westphalia, which was the only relevant region that had submitted a VLR. In addition, the most recent VNRs of the nation states to which the sampled municipalities belong were considered, i.e., nine EU member states, Norway, the UK, and Ukraine, as well as the EU review. All VNRs and the EU review are in English, except for the most recent Spanish VNR, for which the penultimate review was selected instead. In total, the sample consisted of 50 reviews from 36 municipalities, one region, 12 nation states, and the EU (see Table 1).

Table 1. The sample.

Policy level	Relevant voluntary reviews
Supra-national	EU
National	Belgium, Denmark, Finland, Germany, Greece, Netherlands, Norway, Portugal, Spain, Sweden, UK, Ukraine
Regional	North-Rhine Westphalia (DE)
Local	Agios Dimitrios (EL), Amsterdam (NL), Asker (NO), Bad Köstritz (DE), Barcelona (ES), Bonn (DE), Braga (PT), Bristol (UK), Cascais (PT), Dortmund (DE), Düsseldorf (DE), Espoo (FI), Freiburg (DE), Ghent (BE), Gladsaxe (DK), Hamburg (DE), Hanover (DE), Helsingborg (SE), Helsinki (FI), Kiel (DE), London (UK), Lviv (UA), Mafra (PT), Malmö (SE), Mannheim (DE), Matosinhos (PT), Oslo (NO), Rottenburg (DE), Skiathos (EL), Stockholm (SE), Stuttgart (DE), Tampere (FI), Turku (FI), Utrecht (NL), Vantaa (FI), Viken (NO)

With the help of MAXQDA software, the segments in the VLRs with the green goals and other environmental actions were identified. The sub-targets were then used for deductive (sub-)codes. While sorting the coded segments, additional sub-codes were defined inductively for policies mentioned in the reviews at the four policy levels (EU, national, regional, local). Both implemented and planned policy measures were considered, not mere commitments or reiterations of targets. This analysis differentiates between two types of measures: first, site-specific measures typically found at the local level, and municipalities that pioneer them for other municipalities (horizontal diffusion). Second, policy measures that could also be implemented at a higher level, in which case municipalities are multi-level pioneers (vertical diffusion; see Table 2).

The entire reviews were coded. I assigned segments that list a specific measure in relation to a green target to the corresponding (sub-)code/target, and those that do not to the most appropriate (sub-)code/target based on the measure's content. Each measure was assigned only once, except for when the reviews allocate the same policy measures to different goals; for example, most municipalities announce more green

spaces under SDG 15, while Agios Dimitrios and Ghent mention them under both SDG 6 and 15 (see below). I discussed the results of the document analysis in seven semi-structured interviews in October 2024 with sustainability managers from the municipalities most often shown in the results. Four additional interviewees included three consultants and a researcher who prepared first drafts for the VLRs (two consultants were interviewed together). The interviews were conducted virtually and lasted between 30 and 60 minutes. The interviewees reside in Belgium, Denmark, Germany, Sweden, and the Netherlands. It is necessary to maintain their anonymity amidst ongoing controversies over the SDGs' implementation.

The reviews at all levels refer to the targets and indicators of the 2030 Agenda, making them well-suited for comparison, but their limits should be noted. The interviews made clear that the experts who prepared the VLRs were not always aware of all policy measures taken by the respective municipality. Moreover, the reviews do not provide information about the impact of the measures listed. More in-depth research would likely have revealed more policy action and therefore more impact at all levels, but would have encountered new limitations in terms of classification and comparability.

4. Results: Environmental Policy Measures in Voluntary Reviews

The structure of the results' presentation is based on the numeric order of the SDGs and their respective sub-targets. In each subsection, I first present the measures that were mentioned most frequently across all policy levels, or at the highest level. This means that, while I mention measures exclusively listed at higher policy levels, the focus of the analysis is on the local level and those measures for which municipalities are pioneering SDG implementation (see Tables 2–5). After the results of the document analysis, the results of the interview analysis are presented. No significant differences between municipalities in the EU and non-EU member states were found. As with the UN database, the references indicate the policy unit of the review (e.g., Agios Dimitrios). This makes it clear which unit is being referenced instead of listing the individuals who prepared the reviews.

4.1. Policy Measures to Implement SDG 6 "Clean Water and Sanitation"

Regarding drinking water for all (target 6.1), the results show that, in addition to measures at the EU (2023, p. 80) and national level, such as the prohibition of cut-offs to non-paying users (Government of Belgium, 2023, p. 51), there are measures named by both national and local governments, such as the installation of drinking water stations (e.g., City of Freiburg, 2023, p. 41; City of Ghent, 2023, p. 11). Regarding sanitation and hygiene (target 6.2), only municipalities name measures, such as increasing public sanitary facilities, including barrier-free toilets (e.g., City of Freiburg, 2023, p. 45), and compensating tradespeople for allowing the public use of their facilities (Stadt Rottenburg, 2023, p. 39; see Table 2 in the current article).

Most reviews address water issues from an environmental perspective, aiming to reduce pollution (target 6.3). Several reviews mention stricter regulation for pollutant concentrations (EU, 2023, p. 82; Ukraine Department of Economic Strategy and Macroeconomic Forecasting, 2020, p. 50), new plants and upgraded technologies (e.g., Municipality of Bad Köstritz, 2023, p. 37; UK Government, 2019, p. 89, p. 91), but only VLRs include the expansion of the sewer network through the connection of discharge points to the existing public network (City of Ghent, 2023, p. 11) and the laying of wastewater drainage pipes (Lviv City Council, 2023, p. 45). Moreover, the EU (2023, p. 82), the UK, and, at the local level, Düsseldorf name soil management as a policy

measure to address water pollution and ecosystem protection (target 6.3; Landeshauptstadt Düsseldorf, 2022, p. 53; UK Government, 2019, p. 89). In addition, Belgium and Hanover highlight informing and educating residents about water quality under target 6.3 (City of Hanover, 2020, p. 162; Government of Belgium, 2023, p. 51), and Agios Dimitrios also mentions such communicative action about water ecosystems under target 6.6 (Municipality of Agios Dimitrios, 2023, p. 102). To improve water use efficiency (target 6.4), the UK and Bristol mention business cooperation (Bristol City Council, 2022, p. 22; UK Government, 2019, p. 89).

None of the reviews lists explicit measures on integrated water resources management (target 6.5). In order to protect ecosystems (target 6.6), VNRs and VLRs emphasize the restoration and maintenance of water bodies (e.g., Gobierno de Espana, 2018, p. 51; Municipality of Bad Köstritz, 2023, pp. 38–39), fish access to spawning grounds (UK Government, 2019, p. 92; Vantaa, 2023, p. 47), and, at the local level, the connection of water networks and green spaces (City of Ghent, 2023, p. 12; Municipality of Agios Dimitrios, 2023, p. 102).

Regarding international cooperation and capacity-building for developing countries (target 6.a), the EU (2023, p. 84) and a few VNRs name measures, such as official development aid with a focus on water topics (e.g., Government of Belgium, 2023, p. 51). At the local level, Hanover highlights the consideration of water protection in public procurement and fair trade (City of Hanover, 2020, p. 162). In addition, to strengthen local community participation (target 6.b), only the UK names community-led approaches and stakeholder consultation in its VNR (UK Government, 2019, pp. 89, 92).

To summarize, the measures named for SDG 6 are unevenly distributed across the sub-targets, with a preference for measures on less pollution and ecosystems, especially in the VLRs. While access to safe and affordable drinking water is addressed at all levels (target 6.1), sanitation is an issue of municipal action only (target 6.2). Additionally, there are specific measures taken merely at the local level for the protection and restoration of water-related ecosystems (target 6.6) and regarding international cooperation (target 6.a; see Table 2).

Table 2. Pioneering water measures at the local level.

SDG 6 and SDG 11	Site-specific local measures (VLR)	Multi-level measures (VLR)
Target 6.2 (and target 11.1)	Barrier-free toilet facilities (Freiburg, Ghent, Stuttgart) Compensating tradespeople for allowing the public use of their facilities (Rottenburg)	
Target 6.3 (and target 11.6)	Expansion of sewer network through connection of discharge points to existing public network (Ghent) and laying of wastewater drainage pipes (Lviv)	
Target 6.6 (and targets 11.4–5, 11.7)	Connecting water networks and green spaces (Agios Dimitrios, Ghent)	Citizen information and education about water ecosystems (Agios Dimitrios)
Target 6.a (and targets 11.b–c)		Sustainable public procurement in combination with fair trade (Hanover)

4.2. Policy Measures to Implement SDG 13 "Climate Action"

Regarding climate-related hazards and natural disasters (target 13.1), the EU (2023, p. 154) names guidelines on how to climate-proof future infrastructure projects, and two VLRs include the adaptation of their urban development to become more flood resilient (City of Amsterdam, 2022, p. 111; Landeshauptstadt Düsseldorf, 2022, p. 46). Several VNRs highlight plans for an integrated climate adaptation management (e.g., The Danish Government, 2021, p. 118; also Ministry for Climate Protection, Environment, Agriculture, Nature and Consumer Protection of the State of North Rhine-Westphalia, 2016, p. 15), but only a municipality, Düsseldorf, mentions a heavy rain hazard map (Landeshauptstadt Düsseldorf, 2022, p. 46). Belgium lists the creation of cool zones to counteract heat islands (Government of Belgium, 2023, p. 79), but only VLRs mention greening roofs and facades and more vegetation in urban space as measures against extreme heat (e.g., Barcelona City Council, 2022, p. 111; see Table 3 in the current article).

Regarding the integration of climate change measures into other policies (target 13.2), all levels, except for the regional, emphasize city networks in the context of international cooperation on climate change (e.g., City of Ghent, 2023, p. 29; EU, 2023, pp. 155–156, pp. 158–160; The German Federal Government, 2021, pp. 97–99). Moreover, all levels aim to strengthen or create new institutions. At the local level, Bonn describes a participatory process involving climate action days (Federal City of Bonn, 2022, p. 34).

The support of renewable energies is most salient across policy levels (e.g., Government of Belgium, 2023, p. 80; EU, 2023, p. 160; Municipality of Agios Dimitrios, 2023, p. 90, p. 105). Belgium and the UK at the national and Amsterdam and Oslo at the local level highlight carbon capture storage processes (in which a relatively pure stream of carbon dioxide from industrial sources is separated, treated, and transported to a long-term storage location; City of Amsterdam, 2022, p. 113; Government of Belgium, 2023, p. 79; Oslo Kommune, 2023, p. 40; UK Government, 2019, p. 160). The reviews of Ukraine (Ukraine Department of Economic Strategy and Macroeconomic Forecasting 2020, p. 88) and several municipalities mention energy-efficient and environmentally friendly housing (e.g., City of Amsterdam, 2022, p. 112). Only VLRs list climate action through energy-improving heating systems; for example, the decarbonization of district heating (e.g., City of Amsterdam, 2022, p. 112).

Climate action is integrated into transport policy through the expansion of public transport (bus and rail infrastructure; e.g., EU, 2023, p. 160; Gobierno de Espana, 2018, p. 80; The City of Hamburg & BUKEA, 2023, p. 191), electric vehicles (e.g., City of Amsterdam, 2022, p. 113; Government of Belgium, 2023, p. 80; EU, 2023, p. 154), and sustainable fuels in aviation and maritime transport (EU, 2023, p. 154). While Germany lists fuel emissions trading (The German Federal Government, 2021, p. 98), several VLRs mention afforestation to compensate for greenhouse gas emissions (e.g., Landeshauptstadt Düsseldorf, 2022, p. 45). Amsterdam offers a public service for removing tiles (City of Amsterdam, 2022, p. 111), and Hanover highlights public gardens (City of Hanover, 2020, p. 27). Cycling infrastructure is listed in several VLRs exclusively at the local level (e.g., City of Amsterdam, 2022, p. 112), while Gladsaxe and Mannheim mention car-free days (City of Mannheim, 2019, p. 64; Gladsaxe Municipality, 2023, p. 22).

The EU (2023, p. 154) and VNRs highlight fostering innovation (e.g., The Danish Government, 2021, pp. 118–119). In this line, the EU (2023, p. 130), Finland, Norway, and a few municipal pioneers mention green budgeting (e.g., Finish Prime Minister's Office, 2020, p. 130; Landeshauptstadt Düsseldorf, 2022,

p. 45; Norwegian Ministry of Local Government and Modernisation, 2021, p. 81), but only VLRs list sustainable public procurement (e.g., City of Amsterdam, 2022, p. 113). National and local reviews mention business cooperation for the sake of companies becoming more environmentally friendly (e.g., Federal City of Bonn, 2022, p. 33; Finish Prime Minister's Office, 2020, p. 131). Again, only VLRs recognize regional production and circular economy in their VLRs (e.g., London Sustainable Development Commission, 2021, p. 12). Only the EU (2023, p. 160) mentions the integration of climate change measures into agriculture, in particular carbon removal certification, and into trade policy. It also highlights its new Sustainability Reporting Directive in this context (EU, 2023, p. 152).

To improve education, raise awareness, and increase capacity for climate action (target 13.3), national and local reviews emphasize the need for citizen information and education, including climate action campaigns (e.g., Federal City of Bonn, 2022, p. 33; Gobierno de Espana, 2018, p. 70). National and local reviews suggest carrying out school projects (e.g., Finish Prime Minister's Office, 2020, p. 130; The City of Hamburg & BUKEA, 2023, p. 191). Further, at the local level, Barcelona (Barcelona City Council, 2022, p. 113) lists a Climate Emergency Roundtable. Bristol promotes more diverse climate action leadership through a special program (Bristol City Council, 2022, p. 36), and Mannheim acknowledges citizens with an environmental award under SDG 13 (City of Mannheim, 2019, p. 64). Barcelona provides educational equipment for its districts (Barcelona City Council, 2022, p. 113), and Hanover highlights a campaign to promote cycling (City of Hanover, 2020, p. 38).

Table 3. Pioneering climate measures at the local level.

SDG 13 and SDG 11	Site-specific local measures (VLR)	Multi-level measures (VLR)
Target 13.1 (and targets 11.4–5)	Greening roofs and facades, and more vegetation against heat (Barcelona, Düsseldorf, Utrecht) Heavy rain hazard map (Düsseldorf)	
Target 13.2 (and targets 11.2–7, 11.b)	Climate action day (Bonn) and car-free days (Gladsaxe and Mannheim) Cycling infrastructure (Amsterdam, Gladsaxe, Kiel, Oslo) Decarbonization of district heating (Amsterdam, Bonn, Espoo, Gladsaxe, Hamburg, Mannheim, Vantaa) Removing tiles (Amsterdam) Public gardens (Hanover)	Sustainable public procurement (Amsterdam, Asker, Stuttgart, Vantaa; Hanover in combination with fair trade for target 6.a)
Target 13.3. (and targets 11.1–6, 11.b)	Free advisory service about the use of solar energy (Düsseldorf) Soil-cooling capacity map (Düsseldorf) Climate Emergency Roundtable (Barcelona) Provision of education equipment about climate change (Barcelona)	Cycling campaign (Hanover) Environmental awards (Mannheim; Düsseldorf for target 15.5) Black and Green Ambassadors Programme (Bristol) Obligatory meetings with contractual partners about electromobility, energy efficiency, climate adaptation, and flood risks (Düsseldorf)

Moreover, for the local level, only Düsseldorf mentions a free advisory service about the use of solar energy and obliges contractual partners to meetings about electromobility, energy efficiency, climate adaptation, and flood risks. To provide information about the impact of climate change on soil, the city also publishes a soil-cooling capacity map (Landeshauptstadt Düsseldorf, 2022, pp. 36–37, p. 46).

In terms of the financial commitment undertaken by developed-country parties (target 13.a) and raising capacities in least developed countries (target 13.b), the EU (2023, p. 152) and several VNRs mention transfers to the global South (e.g., Government of Belgium, 2023, p. 80). VLRs do not mention a particular commitment in these regards.

To summarize, some measures for SDG 13 are taken exclusively at the local level (see Table 3). With regard to climate-related hazards and natural disasters (target 13.1), a site-specific measure merely taken at the local level is the greening of roofs and facades, and the creation of a heavy rain hazard map. In terms of climate policy integration (target 13.2), only VLRs include a range of both site-specific measures, such as climate action days in the municipality, and multi-level measures, such as sustainable criteria for public procurement. Likewise, regarding educational measures (target 13.3), VLRs list measures that are different for each site, for example, a city's soil-cooling capacity map and a local roundtable. Other measures are not site-specific at all; in particular, public information and education measures (although measures such as cycling campaigns can be more targeted at the local level).

4.3. Policy Measures to Implement SDG 14 "Life Below Water"

Regarding SDG 14 and marine pollution (target 14.1), while the EU (2023, p. 170) and Germany pledge further restrictions on the use of fertilizers in agriculture (The German Federal Government, 2021, p. 120), only Hamburg, at the local level, announces riparian buffers to limit phosphorus pollution (The City of Hamburg & BUKEA, 2023, p. 79). Moreover, VNRs and VLRs consider citizen information and education as crucial to reducing marine debris (e.g., Barcelona City Council, 2022, p. 117; Gobierno de Espana, 2018, pp. 71–72). The UK, Kiel, and Oslo highlight business cooperation; for example, collecting litter from the coastline (City of Kiel, 2022, pp. 4, 38; Oslo Kommune, 2023, p. 43; UK Government, 2019, p. 169). Bristol mentions river clean-ups (Bristol City Council, 2022, p. 38), and a number of municipalities are announcing improvements to their sewage systems (e.g., Barcelona City Council, 2022, p. 117).

In terms of sustainably managing and protecting marine and coastal ecosystems (target 14.2), the EU (2023, p. 170) mentions its new Nature Restoration Law. In addition, its review and two VLRs highlight greater citizen information (EU, 2023, p. 168; e.g., City of Kiel, 2022, pp. 34–37, 41). Asker announces a new center on marine pollution (Asker Kommune, 2021, p. 43). Again, reviews mention international cooperation (e.g., EU, 2023, p. 167; The German Federal Government, 2021, pp. 102–103); for example, through city networks mentioned in other reviews relevant for SDG 13 (City of Kiel, 2022, p. 41), and greater cooperation with other subnational units (The City of Hamburg & BUKEA, 2023, p. 199).

At the local level, Kiel announces more sustainable tourism and an "ocean budget" that provides funding for ocean-friendly initiatives (City of Kiel, 2022, pp. 33–34). Oslo reopens enclosed rivers and streams, a measure that the city also mentions under SDG 15 (Oslo Kommune, 2023, p. 43). Stuttgart and Utrecht list measures for the general protection of water ecosystems under SDG 14, such as fish ladders and doorbells (Gemeente Utrecht, 2023, p. 108; State Capital Stuttgart, 2023, p. 199).

Regarding ocean acidification (target 14.3) and the prevention of overfishing (target 14.4), the EU (2023, p. 168) and several VNRs list measures such as management plans (e.g., The German Federal Government, 2021, p. 102), but VLRs do not. Although the international community already failed to conserve at least 10% of coastal and marine areas by 2020 (target 14.5), the EU (2023, p. 162) review and VNRs underline this target by proclaiming additional conservation areas (e.g., The German Federal Government, 2021, pp. 102–103). Fishing subsidies are set to be eliminated in the EU (2023, p. 167) and Germany (The German Federal Government, 2021, p. 103; target 14.6). The UK (UK Government, 2019, p. 177) mentions the development of sustainable tourism in Fiji and increasing the economic benefits from the sustainable use of marine resources (target 14.7). In addition, at the national and local levels, reviews mention the development of research capacity and knowledge transfer (target 14.a; e.g., Barcelona City Council, 2022, p. 119; Norwegian Ministry of Local Government and Modernisation, 2021, pp. 82–83). However, no review includes measures to provide small-scale artisanal fishers access to marine resources and markets (target 14.b). Only the EU (2023, p. 166) and Germany highlight their commitment to the UN Convention on the Law of the Sea (target 14.c; The German Federal Government, 2021, p. 102).

To summarize, as with SDG 6, the measures for SDG 14 focus on reducing pollution and protecting ecosystems. The VLRs similarly include a variety of site-specific measures, such as reopening closed rivers and streams (see Table 4). Another parallel between these SDGs is that sanitation is only considered in the VLRs, making it a local responsibility under targets 6.2 and 14.1. In addition, municipalities are again pioneering measures relevant to other levels, for example, an ocean budget and a marine center (which could also be funded by higher policy levels).

Table 4. Pioneering ocean measures at the local level.

SDG 14 and SDG 11	Site-specific local measures (VLR)	Multi-level measures (VLR)
Target 14.1 (and targets 11.1, 11.6)	Riparian buffers (Hamburg) Improving sewage facilities (Barcelona, Kiel, Lviv, Oslo, Tampere; Ghent and Lviv also for target 6.3, and Düsseldorf for target 15.1)	
Target 14.2 (and target 11.4)	Reopening closed rivers and streams (Oslo, also for 15.2) Water protection measures, such as fish ladders and doorbells (Utrecht, Stuttgart)	Marine centre (Asker) City networks (Kiel; at all levels for target 13.2) and greater cooperation with other subnational units (Hamburg) Ocean budget (Kiel)

4.4. Policy Measures to Implement SDG 15 "Life on Land"

Regarding SDG 15 and terrestrial and inland freshwater ecosystems (target 15.1), most reviews at all levels highlight the need for additional conservation areas (e.g., EU, 2023, pp. 172, 176; Federal City of Bonn, 2022, p. 48; Government of Belgium, 2023, p. 86). Moreover, the EU (2023, p. 178) supports sustainable land use, while Finland and Norway mention that it has been enshrined in legislation (Finish Prime Minister's Office, 2020, p. 134; Norwegian Ministry of Local Government and Modernisation, 2021, p. 84). At the local level, Düsseldorf focuses on efficient land use (Landeshauptstadt Düsseldorf, 2022, p. 51; see Table 5).

Regarding land restoration, the EU (2023, p. 172) sets binding time targets with its new Nature Restoration Law. Germany mentions the restoration of rivers and adjacent meadows (The German Federal Government, 2021, p. 107), while the UK and Oslo list the restoration of moorlands, and Oslo additionally develops flower meadows by harvesting hay (similar to Kiel, see below for target 15.5; Oslo Kommune, 2023, p. 46; UK Government, 2019, pp. 183, 187). Moreover, at the local level, Stuttgart mentions the renaturation of watercourses (State Capital Stuttgart, 2023, p. 203), and Düsseldorf conducts projects to develop groundwater remediation technology (Landeshauptstadt Düsseldorf, 2022, p. 45S).

In a similar context to the policy integration of climate action (target 13.2), and addressing marine pollution (target 14.1), again, the EU (2023, p. 174) points to agriculture, while VNRs and VLRs highlight the need for sustainability in this sector to accomplish SDG 15 (e.g., Government of Belgium, 2023, p. 86; Landeshauptstadt Düsseldorf, 2022, p. 22). In a similar vein, while other VLRs recognize the need for improved sewage facilities under SDG 14, Düsseldorf mentions the improvement under SDG 15 (Landeshauptstadt Düsseldorf, 2022, p. 45).

To halt deforestation (target 15.2), reviews at all levels include the protection and restoration of woodland area (e.g., Bristol City Council, 2022, p. 40; EU, 2023, pp. 174–175; Government of Belgium, 2023, p. 86). In addition, VNRs and VLRs highlight planting trees and hedges (e.g., Barcelona City Council, 2022, p. 124; UK Government, 2019, p. 186), which includes subsidies for citizens and businesses (Government of Belgium, 2023, p. 86). In addition, the EU (2023, p. 176), Germany, and Denmark, but no VLRs, mention regulation on deforestation-free supply chains and emphasize that international trade should not lead to deforestation in exporting countries (The Danish Government, 2021, p. 122; The German Federal Government, 2021, p. 109).

To combat desertification and restore degraded land and soil (target 15.3), the EU (2023, 76, p. 178, p. 180) reports on its legislation and initiatives to restore degraded land in African countries, a measure similar to Portugal's mention of official development aid for the prevention of desertification and soil degradation (Republica Portuguesa, 2023, p. 160). Germany develops a new indicator to record changes in land and soil use (The German Federal Government, 2021, p. 109). Denmark, Düsseldorf, and Utrecht announce the remediation of contaminated sites (Gemeente Utrecht, 2023, p. 111; Landeshauptstadt Düsseldorf, 2022, p. 45; The Danish Government, 2021, p. 122). Moreover, merely at the local level, Stuttgart mentions reducing land use to protect multifunctional soils, and Barcelona mentions safety strips in the form of pastureland to prevent the spread of fires (Barcelona City Council, 2022, p. 124; State Capital Stuttgart, 2023, p. 205). For the conservation of mountain ecosystems (target 15.4), the EU (2023, p. 179) supports sustainable mountain tourism, and Greece announces a special protection status for mountains (Presidency of the Hellenic Government, 2022, pp. 156–157). No VLRs list policy measures on this sub-target.

While most reviews highlight citizen information and education with regard to all aspects of SDG 15, such measures are mostly categorized as actions to reduce the degradation of natural habitats, and halt the loss of biodiversity and the extinction of threatened species (target 15.5; e.g., Barcelona City Council, 2022, p. 125; EU, 2023, p. 175; Finish Prime Minister's Office, 2020, p. 135). At the local level, Kiel (City of Kiel, 2022, p. 45) organizes a seed exchange festival, and Düsseldorf (Landeshauptstadt Düsseldorf, 2022, p. 78) names an environmental award to increase awareness of biodiversity issues. Moreover, reviews list scientific projects (e.g., Câmara Municipal de Cascais, 2022, p. 24; EU, 2023, p. 175; Government of Belgium, 2023, p. 87) and international cooperation with regards to biodiversity conservation (EU, 2023, pp. 178–179; e.g., Finish Prime

Minister's Office, 2020, p. 134). The EU (2023, p. 174), the Netherlands, and Sweden mention the need for a circular economy (which London lists under target 13.2; Government Offices of Sweden, 2021, p. 121; Kingdom of the Netherlands, 2022, p. 11, p. 22, p. 32).

Several VLRs announce more green spaces, for which Agios Dimitrios and Ghent emphasize their versatile applications, such as recreational effects, flood prevention, and cooling effects under both SDG 6 and 15 (City of Ghent, 2023, p. 12, p. 36; Municipality of Agios Dimitrios, 2023, pp. 93–95, 102). Kiel highlights planting flower meadows for bees (similar to Oslo, see above; City of Kiel, 2022, pp. 5, 44). Utrecht lists measures for species protection when constructing municipal buildings (Gemeente Utrecht, 2023, pp. 111, 113), and Düsseldorf takes action by breeding endangered species. Regarding access to green spaces (Landeshauptstadt Düsseldorf, 2022, p. 23), Kiel announces the protection of the respective zones against the interest of private owners (City of Kiel, 2022, p. 43).

Central issues concerning the international dimension of biodiversity are access to genetic resources (target 15.6) and trafficking of protected species (target 15.7), which are concerns of only the EU and the VNRs (e.g., The Danish Government, 2021, p. 122). By contrast, all policy levels recognize the impact of invasive species (target 15.8). The EU (2023, p. 180), VNRs, and VLRs plan to implement relevant laws (e.g., Government of Belgium, 2023, pp. 86–87; Oslo Kommune, 2023, p. 46). Utrecht lists the manual removal of invasive weed species (Gemeente Utrecht, 2023, pp. 111–112), and Matosinhos focuses on raising awareness about the Velutina wasp to identify and subsequently eliminate this invasive species (Matosinhos City Hall, 2023, p. 63).

Table 5. Pioneering biodiversity measures at the local level.

SDG 15 and SDG 11	Site-specific local measures (VLR)	Multi-level measures (VLR)
Target 15.1 (and targets 11.1, 11.4)	Efficient land use (Düsseldorf) Renaturation of watercourses (Stuttgart) Improving sewage system (Düsseldorf; Ghent and Lviv for target 6.3, and Barcelona, Kiel, Lviv, Oslo, and Tampere for 14.1)	Groundwater remediation technology (Düsseldorf)
Target 15.3 (and target 11.5–6)	Reducing land use (Stuttgart) Safety strips to prevent spread of fires (Barcelona)	
Target 15.5 (and target 11.6–7)	Green spaces (Agios Dimitrios, Düsseldorf, Ghent, Kiel, Hamburg, Oslo; Agios Dimitrios and Ghent also for target 6.6) Flower meadows (Kiel)	Environmental award (Düsseldorf; Mannheim for target 13.3) Seed exchange festival (Kiel) Breeding endangered species (Düsseldorf) Species protection in municipal buildings construction (Utrecht)
Target 15.8 (and target 11.4)	Manual removal of invasive species (Utrecht)	Raising awareness about Velutina wasp (Matosinhos)
Target 15.a (and target 11.1)	Funding for greening buildings (Düsseldorf) Biodiversity plans for zoo (Barcelona)	

With regard to the integration of biodiversity issues into planning (target 15.9), the EU (2023, p. 180), VNRs, and Helsinki announce new principles and methods (e.g., City of Helsinki, 2023, p. 26; The Danish Government, 2021, p. 122). The EU (2023, p. 174), Belgium, and the UK mention the mobilization of financial resources for biodiversity and ecosystems (target 15.a); Government of Belgium, 2023, p. 86; UK Government, 2019, p. 189). At the local level, Düsseldorf highlights a funding program for greening buildings (Landeshauptstadt Düsseldorf, 2022, p. 49, p. 78), and Barcelona describes plans for its new zoo (Barcelona City Council, 2022, p. 125).

Similarly, with regard to the mobilization of resources for forest management (target 15.b), the EU (2023, p. 179), VNRs, and, at the local level, Ghent mention projects (City of Ghent, 2023, p. 67; e.g., Government of Belgium, 2023, p. 87). Kiel highlights funding for a tree nursery in Tanzania. This project could be seen as an approach to increase the capacity of local communities in pursuit of sustainable livelihood opportunities (City of Kiel, 2022, p. 5). None of the reviews mention measures to combat the poaching and trafficking of protected species (target 15.c).

To summarize, VLRs are most innovative with regard to SDG 15. As for targets 6.2 and 14.1, sewage systems are considered a local responsibility in relation to SDG 15. Municipalities emphasize site-specific and thus essentially local measures, such as green spaces and flower meadows, under SDG 15. In parallel, municipalities demonstrate measures of a pioneering character for other policy levels; for example, breeding endangered species (see Table 5).

4.5. Interviews on Policy Measures in the VLRs

The interviews revealed that the rationale for the prioritization of specific SDGs and policy measures in the individual VLRs is different for each municipality (confirming Stockmann & Graf, 2022 on local peculiarities). For example, Ghent started by following the numerical order of the 2030 Agenda. Other municipalities (e.g., Kiel, Malmö) chose the goals that the High-Level Political Forum focused on in the year of publication (interviews #3, 8, and 10, with municipal representatives). In the case of Kiel, SDG 14 happened to be a UN focus goal in 2022, which was in line with marketing the city as a "sailing city" on the Baltic Sea. Malmö, also on the Baltic Sea, missed this opportunity by publishing its VLR a year earlier.

Some municipalities focus on goals that the authors consider to be particularly relevant to the local context (e.g., Amsterdam, Freiburg). Interviewees described site-specific environmental measures as more controversial, especially given the existing competition for space between more green areas and more land allotments reserved for new housing and car parking (e.g., interviews #1, 3, and 8, with municipal representatives). Other municipalities use the VLRs to put pressure on higher policy levels to become more environmentally sustainable (interviews #1, 4, and 5, with municipal representatives). Interviewees said that individual colleagues showed particular commitment to measures that are not site-specific and could also be implemented at a higher policy level; for example, sustainable criteria in public procurement (e.g., interview #2, with a municipal representative).

Representatives of cities that see their VLRs as a means of advocacy argued that they should be made mandatory rather than voluntary (e.g., interviews #1 and 8, with municipal representatives). In this context, the consultants emphasized the lack of standards and the resulting lack of comparability: "I also tell them

[municipal representatives]: If you don't have any data on SDG 14…then leave it out. That's okay for a VLR. You don't even have to explain why you're leaving it out!" (interview #9, with a consultant; confirming Krellenberg et al., 2019). The interviews revealed that local representatives are particularly relieved when they realize that they do not have to report on green targets (interviews #7 and 9, with consultants). However, the consultants considered the option of mandatory local reviews—providing data for the indicators of all SDGs—to be "unrealistic," mainly due to the "resources that would have to be invested" (interview #9, with a consultant).

5. Discussion and Conclusions for the Post-2030 Agenda

Municipalities are leading the way in implementing SDGs, but they demonstrate a "glocality" (Barber, 2014) that is only periodically and selectively applied to specific areas (confirming Clement et al., 2023, also for the green goals). VLRs list very few "concrete and feasible" environmental measures (Elder, 2024, p. 8) that contribute to the realization of SDG 11 "Sustainable cities and communities" (see Tables 2–5). Local governments, like other policy levels (Elder, 2024; Partzsch, 2023), are far behind in prioritizing the environment in sustainability governance. VLRs do not show a "mental rupture" (Sachs, 2017, p. 2576).

The distinction between the two types of local policy measures proved to be useful (see Tables 2–5). Municipalities are often the only policy level at which action can be taken. In this vein, the VLRs include site-specific measures designed for a particular location to accomplish the environmental sub-targets of SDG 11, such as cycling infrastructure, green spaces, and restoring watercourses. Other measures are not necessarily a municipal responsibility and would be more appropriate at a higher policy level, such as sustainability criteria for public procurement and fair trade. These multi-level measures should fall under (supra-)national responsibility. While the first type of measures allows municipalities to pioneer horizontal diffusion, i.e., uptake by other municipalities at the same policy level, the second type also provides the opportunity for vertical diffusion "from the bottom up" to higher policy levels.

Conflicts over necessary prioritization, for example, regarding competing land uses or limited budgets, cannot be resolved solely through reporting, but VLRs provide a basis for further decision-making. Moreover, compelling the data for the reviews can help communities internally to move beyond "thinking in silos" to truly integrate (environmental) sustainability into everyday decisions. This requires local ownership, which tends to be less likely if reviews are prepared by outside consultants (although municipal representatives emphasized that consultants were helpful in facilitating collaborative processes; interviews #1 and 3). In the future, while external standards pose a risk to internal ownership, the standardization of data could be used to compare the performance of municipalities in terms of impact.

A post-2030 Agenda should hold municipalities accountable for site-specific actions that can only be taken at the local level (based on judicial action for misconduct rather than reporting). Responsibilities for multi-level measures need to be more clearly assigned. For instance, it is unconvincing that the drinking water supply is addressed at all levels, but issues regarding wastewater are not. Integrating sustainability in trade and procurement policies is another example of a measure more relevant to higher policy levels, at least in Europe, where municipalities have relatively small budgets and insignificant responsibility in these areas (see also Kosovac & Pejic, 2023).

While a clear vertical distribution of tasks is necessary, greater efforts are also needed regarding horizontal interrelations. The fact that the same measures are assigned to different goals in different VLRs highlights that their cross-cutting potential has not yet been realized. More research is needed regarding synergies and trade-offs. There are initial approaches to cooperation between municipalities (e.g., interview #3, with a municipal representative). Cycle lanes, for example, are clearly a local responsibility, but are less useful if they end at the municipal boundary. The post-2030 Agenda should thus take an even more integrated approach.

Acknowledgments

The author would like to thank the interviewees for their time and the two student assistants Moritz Dorn and Nike Stenzel for their help in transcribing the interviews, coding the documents, and formatting the manuscript. Edmund Obermeyer did an excellent job proofreading: Thank you! Thanks also go to the organizers and participants of the localization panels at the Utrecht Global Goals Conference in September 2024 for their constructive feedback on a presentation of first results, especially Mark Elder and Thomas Hickmann. The author is grateful for the anonymous reviewers' and the academic editors of this thematic issue's feedback.

Funding

Publication of this article in open access was made possible through the institutional membership agreement between Freie Universität Berlin and Cogitatio Press.

Conflict of Interests

The author declares no conflict of interests.

Data Availability

The Voluntary Local Reviews (VLRs) are available at https://sdgs.un.org/topics/voluntary-local-reviews.

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