Supplementary Material

The table presents all variables included in the study, along with their coding structure, type (nominal, ordinal, numerical), and operational definitions. The variables capture key dimensions of sustainability action characteristics, including action design, environmental domains, governance and participation features, environmental and sustainability outcomes, and environmental citizenship (EC) outcomes, based on the Environmental Citizenship Education (EEC) model (Hadjichambis & Paraskeva-Hadjichambi, 2020).

Table S1. Coding scheme and operational definitions of variables used in the analysis of sustainability actions in Green Cities.

#	Variable	Coding	Type of Variable	Operational Definition / Information
1	Year	Exact Year	Nominal	In this study, Year refers to the exact year in which the sustainability action was implemented or awarded within the Green Cities Awards framework.
2	Municipality Type	1=Municipality, 2=Community	Nominal	In this study, Municipality Type refers to the administrative classification of the local authority implementing the sustainability action, distinguishing between municipalities and communities.
3	Population Size	1≤1,000; 2=1,001–5,000; 3=5,001–20,000; 4=20,001–100,000; 5≥100,000	Ordinal	In this study, Population Size refers to the total number of residents within the administrative boundaries of the municipality or community implementing the sustainability action, categorized into predefined population ranges.
4	Action Type	1=Infrastructure; 2=Awareness campaign; 3=Educational program; 4=Policy/regulation; 5=Pilot project; 6=Technological solution	Nominal	In this study, Action Type refers to the primary nature of the sustainability intervention, capturing whether the action is infrastructural, educational, policy-based, technological, or awareness-oriented.
5	Environmental Domain	1=Air Quality; 2=Sustainable Mobility and Transport; 3=Green Areas and Biodiversity; 4=Waste Management (Solid and Liquid Waste); 5=Sustainable Energy Consumption and Renewable Energy; 6=Quiet City – Noise Management; 7=Water Resources Management; 8=Sustainable Tourism; 9=Sustainable Built Environment; 10=Environmental Awareness and Education; 11=Climate Change, Environmental	Nominal	In this study, Environmental Domain refers to the specific sector of urban sustainability targeted by the action, reflecting the thematic area of environmental intervention (e.g., energy, biodiversity, waste, mobility).

		Standards and e-Governance; 12=Culture and Environment		
6	SDG Alignment	1=SDG11; 2=SDG12; 3=SDG13; 4=SDG15; 5=Other; 6=Multiple	Nominal	SDG 11: Sustainable Cities and Communities, SDG 12: Responsible Consumption and Production, SDG13: Climate Action, SDG15: Life on Land
7	Scale of Action	1=Neighbourhood; 2=Municipal; 3=Regional; 4=National	Nominal	In this study, Scale of Action refers to the spatial level at which the sustainability action is implemented, ranging from local neighbourhood initiatives to national-level interventions.
8	Innovation Level	1=Low; 2=Medium; 3=High	Numerical	Innovation level refers to the extent to which a sustainability action incorporates novel ideas, technologies, governance approaches, or practices that significantly improve environmental performance or introduce new solutions to urban sustainability challenges.
9	Technology Use	0=No; 1=Yes	Nominal	In this study, Technology Use refers to the extent to which the sustainability action incorporates technological tools, digital systems, or innovative technical solutions to enhance effectiveness.
10	Nature Based Solutions	0=No; 1=Yes	Nominal	Nature-Based Solutions (NBS) are actions inspired by, supported by, or copied from nature that aim to address environmental and societal challenges through the protection, sustainable management, and restoration of ecosystems. Such solutions simultaneously contribute to biodiversity conservation, climate change mitigation and adaptation, improved ecosystem services, and enhanced human well-being.
11	Evidence Based Planning	0=No; 1=Yes	Nominal	In this study, Evidence-Based Planning refers to the extent to which the design and implementation of the sustainability action are informed by scientific data, research findings, indicators, or documented best practices.
12	Citizen Participation	0=None; 1=Limited; 2=Active	Numerical	In this study, Citizen Participation refers to the degree of involvement of citizens in the planning, implementation, or evaluation of sustainability actions, ranging from no participation to active engagement.
13	Community Engagement	0=No; 1=Yes	Nominal	In this study, Community Engagement refers to the presence of organized efforts to involve local communities, stakeholders, or

				social groups in sustainability actions beyond passive participation.
14	Volunteer Participation	0=No; 1=Yes	Nominal	In this study, Volunteer Participation refers to the involvement of individuals offering voluntary, unpaid contributions to the implementation or support of sustainability actions.
15	Behaviour Change	0=No; 1=Yes	Numerical	In this study, Behaviour Change refers to the extent to which sustainability actions aim to influence or result in measurable changes in βehaviour, habits, or practices of individuals or communities.
16	Partnerships	0=No; 1=Yes	Numerical	In this study, Partnership refers to partnerships between the Public and the Private sector (PPP).
17	Environmental Impact	1=Low; 2=Medium; 3=High	Numerical	In this study, Environmental Impact refers to the overall effectiveness of the sustainability action in producing measurable environmental improvements across relevant domains.
18	Climate Mitigation	0=No; 1=Yes	Numerical	In this study, Climate Mitigation refers to municipal sustainability actions that contribute to the reduction of greenhouse gas emissions or increase carbon sequestration within urban environments.
19	Climate Adaptation	0=No; 1=Yes	Numerical	In this study, Climate Adaptation refers to municipal sustainability actions that aim to reduce the vulnerability of urban systems to climate change impacts such as heat waves, flooding, drought, or extreme weather events.
20	Biodiversity Protection	0=No; 1=Yes	Numerical	In this study, Biodiversity Protection refers to municipal sustainability actions that contribute to the conservation, restoration, or enhancement of biodiversity within urban or peri-urban environments.
21	Education Impact	0=No; 1=Yes	Numerical	In this study, Education Impact refers to the extent to which municipal sustainability actions include educational components that promote environmental awareness, knowledge dissemination, or behavioral change related to sustainability.
22	Social Inclusion	0=No; 1=Yes	Numerical	In this study, Social Inclusion refers to municipal sustainability actions that explicitly promote equitable participation,

				accessibility, or benefits for diverse social groups, including vulnerable or underrepresented populations.
23	Beneficiaries	1≤100; 2=100–1000; 3≥1000	Ordinal	In this study, Beneficiaries refer to the estimated number of individuals or population groups that benefit from a municipal sustainability action either directly (e.g., participants, residents of a specific area) or indirectly (e.g., wider urban population).
24	Long Term Sustainability	1=Short-term; 2=Medium-term; 3=Long-term	Numerical	In this study, Long-Term Sustainability refers to the extent to which municipal sustainability actions are designed to produce lasting benefits and remain operational or effective beyond the initial implementation phase.
25	EC Outcomes			In this study, Environmental Citizenship (EC) Outcomes refer to the extent to which sustainability actions contribute to the development of environmentally responsible citizens, based on the Environmental Citizenship Education (EEC) model (Hadjichambis & Paraskeva-Hadjichambi, 2020).
25.1=	Solution of current environmental problems	0=No; 1=Yes	Numerical	Refers to the extent to which the action contributes directly to addressing existing environmental issues. Based on EEC Model Source: Hadjichambis and Paraskeva-Hadjichambi, 2020 Example: The project promotes the reduction of environmental pollutants in the city through the increased use of buses and the implementation of the initiative “City Moves Green: Innovative Micromobility Solutions for Youth and the Community”. By strengthening sustainable mobility practices and encouraging low-emission transportation alternatives, the project contributes to the solution of current environmental problems, particularly urban air pollution and transport-related greenhouse gas emissions.
25.2	Prevention of the creation of new environmental problems	0=No; 1=Yes	Numerical	Refers to the extent to which the action proactively reduces the likelihood of future environmental problems. Based on EEC Model Source: Hadjichambis and Paraskeva-Hadjichambi, 2020. Example: The initiative promotes the reduction of groundwater consumption and enhances public environmental awareness within the municipality, aiming to support the rational management of water resources and the prevention of future

				environmental problems related to water scarcity and the depletion of underground water reserves. By encouraging preventive and sustainable water-use practices, the project contributes to the prevention of the creation of new environmental problems associated with unsustainable groundwater consumption.
25.3	Addressing the structural causes of environmental problems	0=No; 1=Yes	Numerical	Refers to the extent to which the action targets underlying systemic, social, or economic drivers of environmental degradation. Based on EEC Model Source: Hadjichambis and Paraskeva-Hadjichambi, 2020. Example: The project strengthens environmental awareness regarding a specific local ecosystem by fostering understanding not only of its ecological value and conservation needs, but also of the structural drivers of environmental degradation, including urbanization pressures, human interventions, land-use practices, and broader development patterns. In this way, the project contributes to addressing the systemic causes of environmental problems through informed and active civic engagement.
25.4	Development of a healthy relationship with nature	0=No; 1=Yes	Numerical	Refers to the extent to which the action fosters values, attitudes, and behaviours that promote a respectful and sustainable relationship between humans and nature. Based on EEC Model Source: Hadjichambis and Paraskeva-Hadjichambi, 2020. Example: The creation of the “Bee Park” in a Municipality that enhances citizens’ quality of life and promotes direct experiential contact with nature, fostering awareness of biodiversity and the ecological importance of pollinators. The project contributes to the development of a healthy human–nature relationship by strengthening ecological sensitivity, environmental awareness, and citizens’ everyday connection with the natural environment.
25.5	Practice of environmental rights and duties;	0=No; 1=Yes	Numerical	Refers to the extent to which the action promotes awareness and enactment of environmental rights and responsibilities among

				citizens. Based on EEC Model Source: Hadjichambis and Paraskeva-Hadjichambi, 2020. Example: The project promotes and operationalises the practice of environmental rights and duties through a participatory, technology-supported recycling system. Citizens actively engage in responsible waste management by using QR-code-enabled recycling bins and digital monitoring tools, thereby exercising their environmental responsibilities in everyday practice. Simultaneously, the incentive-based mechanism further strengthens citizens' engagement in the practice of environmental rights and duties.
25.6	Achievement of critical and active engagement and civic participation	0=No; 1=Yes	Numerical	Refers to the extent to which the action enhances citizens' capacity for critical thinking, active involvement, and participation in environmental decision-making processes. Based on EEC Model Source: Hadjichambis and Paraskeva-Hadjichambi, 2020. Example: The local authority assigned four public spaces to community residents with the aim of transforming them into green areas, thereby promoting critical and active engagement as well as civic participation in local environmental issues. The initiative reflects the active involvement of citizens in environmental decision-making and community-based action, strengthening their sense of environmental responsibility, collective ownership, and participation in the sustainable improvement of their local environment.
25.7	Promotion of inter/intra-generational justice	0=No; 1=Yes	Numerical	Refers to the extent to which the action promotes fairness and equity within and between generations in relation to environmental resources and impacts. Based on EEC Model Source: Hadjichambis and Paraskeva-Hadjichambi, 2020.

				Example: The municipality installs photovoltaic systems in public buildings and schools in order to promote the use of clean and renewable energy. The initiative contributes to the promotion of inter- and intra-generational justice by reducing environmental pollution for future generations, while simultaneously providing present-day social and economic benefits through reduced energy costs and the reallocation of financial resources to community projects that promote social equity and intra-generational justice.
25.8	Achievement of sustainability	0=No; 1=Yes	Numerical	Refers to the extent to which the action contributes to broader sustainability goals by integrating environmental, social, and economic dimensions. Based on EEC Model Source: Hadjichambis and Paraskeva-Hadjichambi, 2020. Example: The project promotes sustainable mobility by reducing private car dependency and encouraging environmentally friendly modes of transportation, including walking, cycling, and public transport. Through pedestrianisation measures, cycling infrastructure, electromobility initiatives, and improved traffic management, the project contributes to the achievement of sustainability by reducing pollution, enhancing urban environmental quality, and improving citizens' quality of life.