

## Article

# Toward Achieving Local Sustainable Development: Market-Based Instruments (MBIs) for Localizing UN Sustainable Development Goals

Ying Zhou <sup>1,\*</sup>, Amelia Clarke <sup>1</sup> and Stephanie Cairns <sup>2</sup>

<sup>1</sup> School of Environment, Enterprise and Development (SEED), University of Waterloo, Waterloo, ON N2L 3G1, Canada; amelia.clarke@uwaterloo.ca

<sup>2</sup> Smart Prosperity Institute, Ottawa, ON K1N 6N5, Canada; stephanie@wrangellia.ca

\* Correspondence: ying.zhou@uwaterloo.ca

**Abstract:** In recent years, sustainable community development has gained traction for addressing local environmental, social, and economic issues. Cities worldwide are committed to implementing sustainable community plans (SCPs) in their efforts to achieve sustainable development, and more recently, to localize the United Nations' Sustainable Development Goals (SDGs). Although there are over 1000 plans in Canada, a gap exists between creating these plans and implementing them. Integrating market-based instruments (MBIs) with traditional policy tools would help to diversify revenue generation and thus mitigate these constraints. This paper presents a new and comprehensive categorization of MBIs that aligns the locally applicable ones with the environmental aims of both SCPs and SDGs. The categorization framework has been tested through focus groups with key municipal staff from two Canadian communities. The new categorization framework aligned over 50 locally applicable MBIs with 8 different environmental topics and 12 SDGs. The paper presents a useful tool for implementing SCPs and SDGs and contributes to the understanding of MBIs for enabling local progress in sustainable development.

**Keywords:** sustainable development; sustainability plan; market-based instrument; implementation; cities; SDGs



**Citation:** Zhou, Y.; Clarke, A.; Cairns, S. Toward Achieving Local Sustainable Development: Market-Based Instruments (MBIs) for Localizing UN Sustainable Development Goals. *Urban Sci.* **2022**, *6*, 24. <https://doi.org/10.3390/urbansci6010024>

Academic Editor: Thomas W. Sanchez

Received: 30 January 2022

Accepted: 4 March 2022

Published: 15 March 2022

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

The *Brundtland Report—Our Common Future*, published in 1987, provided the first official definition of sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [1]. This definition, which was created by the World Commission on Environment and Development (WCED), is frequently used when discussing environmental and sustainability issues. [2]. Since then, interest in sustainability has motivated progress in local sustainable development to address challenges within the three pillars (environment, social and economy) [3–5]. As part of the United Nations 2030 Agenda, 17 Sustainable Development Goals (SDGs) were proposed in 2015, and various actors (from countries to municipalities) are tasked with meeting these goals [6]. Although all member states of the United Nations agreed to adopt the SDGs, national to local implementation and progress toward these goals varies significantly as many involved in the process are faced with policy challenges in implementing these goals [7,8].

At the local level, sustainable development focuses on the abilities of municipalities and communities to “initiate and generate their own solutions to their common economic problems and thereby build long-term community capacity and foster the integration of economic, social and environmental objectives” [9]. Hence, communities have developed sustainable community plans (SCPs) to address complex sustainability challenges at the

local scale [10–12] and also in recent years as a means of attaining the United Nations' proposed sustainable development goals (SDGs) [13].

Although interest in sustainable community planning remains high, many associated complications are impeding the implementation of these plans [14,15]. At the local level, over 50 barriers were identified to achieving sustainable development, including lack of education and understanding, political resistance, lack of political leadership, difficulty in shifting values and behaviour, and lack of current and accessible data on sustainable development [12]. These barriers translate into a planning–implementation gap for many communities in Canada [12].

This paper aims to identify the potential of market-based instruments (MBIs) as a complementary and innovative approach to the implementation of SCPs by illuminating the MBIs that are applicable at the local level. MBIs are defined as regulations that stimulate behaviour changes to meet desired goals and outcomes through market signals and approaches [16]. While the use of MBIs is widely discussed, research exploring the practice of using MBIs as a way to implement SCPs is rare. Even though MBIs can add significant efficiency to the implementation of SCPs and SDGs, not all MBIs are applicable to cities. Thus, using MBIs for SCP implementation is likely to succeed if local contexts and capacities are considered. As a component of this objective, this paper presents a suite of existing and emerging MBIs under municipal jurisdiction in Ontario, Canada with an innovative method of categorising MBIs that enhance the alignment of pricing and other market mechanisms with environmental objectives to better inform municipal decision making. While municipal jurisdictions vary by region and country, much of this paper's findings should have relevance for local governments worldwide.

## 2. Sustainable Community Planning and Market-Based Instruments

### 2.1. Sustainable Community Plans (SCPs) and the Plan–Implementation Gap

Approximately 6500 local communities in 113 countries have an SCP or a related equivalent, and the numbers continue to grow as over 10,000 communities are committed to achieving local sustainability [17,18]. Paragraph 89 of the UN's 2030 Agenda for Sustainable Development also emphasizes the role of local and regional municipalities in SDG integration and the importance of localizing the goals in the 2030 Agenda [19]. To achieve the SDG goals highlighted in the 2030 Agenda, municipalities have reconsidered aligning SCPs to further their implementation of the SDG goals at the local level [13].

SCPs usually contain a broad range of sustainable goals and targets, which can be grouped into topics. They are also referred to as integrated community sustainability plans (ICSPs), local action plans for sustainable development, local agenda 21s, or similar names [13,20,21]. They may also be part of a municipal official/master plan [22]. Many topics covered in the SCPs are an integration of the three pillars of sustainability—economic, environmental, and social [9]. The top 10 topics found in the SCPs for Canadian Municipalities are presented in Table 1 [23].

In Canadian communities, environmental topics take a high priority; in fact, nine out of the top ten most-covered topics in SCPs have an environmental focus. These generally include environmental goals related to air quality, climate change, ecological diversity, energy, food security, land use, transportation, waste and/or water [23]. These environmental topics are similar to those noted in SCPs worldwide and are also ranked among the top eight in priority with the exception of food security [13].

SCPs are generally developed through public consultation involving multiple stakeholders to ensure diverse representation [20]. They are crucial to sustainable community development, as each plan attempts to (1) identify the vision for their community; (2) integrate their goals with the three pillars of sustainable development; and (3) establish community targets for achieving local sustainability progress [11]. SCPs also support the implementation of sustainable development by setting timespans for reaching goals and targets, ranging from short-term to long-term (from one to five years to over twenty-five years) [11].

**Table 1.** Top 10 topics covered in Canadian SCPs.

| Topics Covered in the SCPs | Rank among All SCPs Topics | SCPs Containing the Topic (in Percentage) |
|----------------------------|----------------------------|---|
| Transportation             | 1                          | 98%                                       |
| Water                      | 2                          | 97%                                       |
| Waste                      | 3                          | 92%                                       |
| Air Quality                | 4                          | 90%                                       |
| Energy                     | 5                          | 90%                                       |
| Land Use                   | 6                          | 89%                                       |
| Climate Change             | 7                          | 84%                                       |
| Food Security              | 8                          | 81%                                       |
| Local Economy              | 9                          | 78%                                       |
| Ecological Diversity       | 10                         | 74%                                       |

While some municipalities and communities have adopted SCPs, not all of them succeed in achieving sustainability goals [12,24]. As a result, communities are becoming increasingly aware of the gap between developing and implementing SCPs and are attempting to address the gridlock between the planning and implementation stages of SCPs [12]. Most Canadian communities are still using antiquated strategies that prioritize growth [25]. These outdated strategies and regulations impede implementation and thus require changes in their implementation process and strategies [12]. In addition, many of the traditional mechanisms are expensive to implement, especially monitoring and control techniques [9]. Williamson argues that implementation processes need greater individual flexibility and more flexible economic valuation processes [26]. In short, innovative approaches to complement traditional strategies and regulations are needed as a mixture of various types of policy instruments is necessary to promote collective action at the local level [27].

The concept of smart cities is a related emergent perspective for local sustainable transformation and sustainable community development [28,29]. This approach focuses on the application of new technologies and the integration of a technological lens with existing local infrastructure to support sustainable urban transformation [28,30,31]. Smart cities create livable and sustainable urban centers through participatory governance and innovative technologies [32,33]. Compared with the concept of sustainable cities, smart cities have greater emphasis on the economic and social dimensions of sustainability over the environmental pillar of sustainable development [34].

Whether a municipality adopts a technological lens or continues to implement traditional regulations in pursuit of becoming a sustainable community, market-based mechanisms can be a complementary approach. The use of market ‘signaling’ in environmental policy to achieve incentive effects and maintain strong environmental performance is the current trend for market-based approaches [12,35]. This innovative approach allows local governments to achieve their environmental goals and generate financial co-benefits both through powerful price signals and other types of indirect market signals [12,36].

## 2.2. Market-Based Instruments (MBIs) for Implementing SCPs

Piquou recognized the potential and advantages of market-based instruments, policies, and mechanisms [37]. MBIs are fiscal tools that encourage positive behaviours by utilising market mechanisms, such as price, financial incentives and other direct or indirect economic variables [16]. They can also be categorized using many different approaches. Previous studies often identified MBIs using the following two general categorizations of MBIs:

- By types of MBIs: Price-based, rights-based, and friction reduction instruments [12,21,38,39].

- By functions of MBIs: Systems for pollution charges and deposit refund, tradable permits, reduction in market barriers, and elimination of government subsidies [40]; and pollution charges, tradable permits, market friction reduction systems, and government subsidy [16].

Studies have classified MBIs using three broad types: (1) price-based, (2) rights-based, and (3) friction reduction instruments [12,22,38,39]. Price-based instruments follow approaches where the price of goods and services are adjusted to include the hidden environmental and social costs. In this case, the government is responsible for setting the prices of such products or services, while the quantity produced varies depending on market response [41]. For example, congestion pricing is a price-based instrument [42]. Rights-based instruments are tools for controlling the quantity or quality of goods and services (commonly issued by governments or other regulating bodies). In response to any limitation, the prices of these goods and services reflect market responses [26,28]. A tradable mobility permit is a common rights-based instrument [43]. Friction reduction instruments reduce market functions such as monopoly, externalities, and information failures to motivate behavioural change [29,30]. They also remain relevant as means for implementing SCPs [29]. Eco-labeling is an example of a friction-reduction instrument [44].

Categorizations of MBIs also extend beyond determining the types of MBIs. Studies have also categorized MBIs by the general function of the instruments. Hockenstein et al. used a four-category model, separating pricing and non-pricing instruments and used the following classifications: charges, permits, deposit-refund systems, market barrier reductions, and government subsidies [40]. Stavins further simplified and revised the original five main groups of market mechanisms, ending with four: pollution charge systems (price-based instruments), tradable permits (rights-based instruments), market friction-reduction mechanisms (friction reduction instruments), and government subsidies (price-based instruments) [16]. Similarities in classification also exist between Hendrickson et al. [12] and Stavins [16]. However, Stavins' framework has categories for government subsidies as well as the deposit refund system category with pollution charge systems [16]. Most of the identified MBIs and the categorization frameworks have an environmental focus and demonstrate potential cost saving and revenue generation [12,45].

These methods of MBI classification clearly show that each identified category encompasses an extremely diverse array of possible MBIs, creating confusion, as some of the instruments in the same group have very few shared characteristics in terms of strengths, weaknesses, and scope of application [46]. Moreover, the environmental relevance and other non-economic characteristics of MBIs are rarely distinguished through these common MBI classifications.

Achieving sustainable development typically requires the identification of sustainability goals and some means to reach them [12]. However, it was not until recent years that community policymakers started to make connections between MBIs and sustainable community development [47]. Communities have created SCPs to identify their sustainability goals and targets (SCP). Market-based approaches and policies have been adopted as means of implementing environmental sustainability goals and advancing local sustainable development efforts [48]. Interest in this approach is due to the planning–implementation gap and the economic considerations that come with long-term community development [9,12]. For transportation, MBIs such as congestion fees, fuel taxes, and tradable mobility permits provide abatement incentives for emission reduction, increased travel-time savings for community residents, and reduced vehicle travel and ownership [42,43,49,50]. Pay-as-you-throw systems for waste management [51,52] and water pricing schemes [52] are commonly used to effectively manage resources and minimize waste [36,53]. Payments for environmental services (PES) and biodiversity environmental funds are among other commonly identified MBIs for the protection of ecological diversity and sustainable land use [35,46]. Additionally, MBIs have also been utilized as a policy instrument to manage other environmental issues such as climate-related flood risks and droughts [54,55], and air pollution in cities [56]. More recently, the adoption of carbon pricing schemes, along

with other local-level MBIs, have been used as means of achieving decarbonization on both the national and local scale [57,58]. Despite the vast amount of scholarship on specific uses and effects of MBIs on environmental sustainability goals, there is a need for broader classification of all options for local environmental planning and sustainable progress.

When compared with traditional policy approaches, MBIs are flexible, accountable, and transparent [12,16]. Moreover, they allow for environmental burdens to be proportionately shared and improve the alignment of environmental and financial resources with sustainability goals and targets [38]. User fees, for example, are paid only by individuals using the goods or services and are also reinvested to further benefit the users [42]. Adopting MBIs for SCP implementation diversifies the local revenue stream and benefits communities that pursue sustainable development but which are facing barriers such as financial stress and budget constraints [25,59,60]. Additionally, the revenue generation from an MBI approach also motivates communities to improve their asset and natural capital management [9,47]. For example, environmental taxes create a double dividend effect by discouraging negative environmental impacts and simultaneously promoting social welfare [61]. Although the main function of MBIs is incentive generation through their linkage with markets, social and equity issues are also important considerations in the design of MBIs. Only if they are properly designed, MBIs are able to reflect shifts in policies and improve market efficiencies [12].

The market approach to sustainable development compliments conventional approaches in sustainable community planning by reducing some of the weaknesses of traditional approaches and their ‘command-and-control’ regulations. Often, these earlier approaches fail to consider and align economic signals with sustainability goals [12,16]. Communities are encouraged to better manage their assets by the financial incentives or disincentives associated with using MBIs while also generating new revenue. Compared to MBIs, ‘command-and-control’ regulations are rigid, pricey, and spread environmental costs uniformly to all [12,16]. Other identified weaknesses of the conventional means of SCP implementation are unduly high expenses and costs for the community, lack of motivation for those who strive to do more than simply comply to required standards, and sometimes dismaying changes in policies and governance [9,16,40]. Although market-based instruments (MBIs) have gained prominence as means of SCP implementation, there is unquestionably a need to clarify the alignment between MBIs and environmental goals in SCPs and SDGs. A new and comprehensive categorization will be useful in distinguishing all the MBIs relevant to local sustainable development and improving knowledge of the scope of their application to cities.

In summary, MBIs can help with the implementation of the various environmental objectives outlined in the SCPs. However, they are not intended to replace the ‘command-and-control method’ of SCP implementation, but rather provide a complementary approach. The following table summarizes some of the characteristics of traditional versus fiscal policy tools (Table 2).

**Table 2.** Summary of Traditional versus Fiscal Policy Tools.

| Traditional Policy Tools                                     | Market-Based or Fiscal Tools                         |
|--|--|
| Rigid  | Flexible   |
| Compliance   | Motivate change in behaviour                         |
| Fixed revenue generation                                     | Diverse revenue generation                           |
| Align economic drivers with sustainability goals and targets | Revenues align with sustainability goals and targets |
| Environmental burdens are equally shared                     | Environmental burdens are proportionately shared     |
| Costly   | May result in cost saving                            |

Most MBIs and their categorization frameworks demonstrate potential cost saving and revenue generation, and some even have an environmental focus [12,37,39,40,45]. Thus, these market instruments can be useful in the implementation of SCPs [12,39].

### *2.3. Canadian Municipal Jurisdiction and Power for Implementing MBIs*

Despite both the environmental and economic advantages of MBIs, many communities rarely consider aligning their existing financial and tax-incentive structure to include broader sustainability goals [62]. Hence, local governments need to understand the extent of their legislative power in order to achieve sustainable community development and effectively use MBIs for the implementation of SCPs [25,63].

In Canada, the constitutional distribution of legislative powers is between two orders of government: the federal government and provincial governments, where provincial legislatures concern matters of a local nature [64,65]. Under the Canadian Constitution Act, Canadian municipal institutions are subject to exclusive provincial legislation [65]. The municipalities receive power from the provincial legislatures and are bound by provincial laws and regulations [65]. Thus, the province controls the extent of power of municipalities and delegates the roles and responsibilities of local governments [65]. Most of the municipalities in Canada, with the exception of a few chartered cities, are second along the continuum of local empowerment (from weakest to the strongest) [66]. Canadian municipalities are further along the continuum when compared to cities that lack any independent existence but have much less autonomy and power compared to those with extensive legislative powers to act in local affairs or even their own constitutions [66]. In Ontario, Canada, municipalities are responsible for water and sewage, residential waste collection, transportation and housing, utilities, public health and safety, social and welfare services, recreation and community amenities, and planning and development [64,67].

Canadian municipalities generate their own revenue from taxes, user fees, sales of goods and services, and grants [67]. However, municipalities in Canada have limited power of taxation. Hence, they can only impose property taxes and fees from permits and licenses [64]. As a result, new local revenue is raised mainly from the introduction or rate increase in user fees and other price charges [64]. It is critical to understand the distinction between user fees and taxes. First, taxes are compulsory, but user fees are paid only by the individuals using the goods or services [42]. Second, taxes serve a public purpose, as they raise money for the general budget, while revenue from user fees is intended to be reinvested into the goods or services to benefit the users [42]. Unlike taxes, the size of user fees is limited as the fees and charges cannot exceed the cost of supplying the goods or services [42].

Overall, many researchers have emphasized the importance of price signals and market-based mechanisms to modify behaviour while generating economic gains [12]. Thus, there is strong potential for the use of MBIs as means to stimulate sustainable community development. The focus of this paper is the development of a new and comprehensive categorization of MBIs that aligns MBIs under the municipal jurisdiction with the potential to achieve the environmental objectives in a SCP and the related SDG targets. The suite of MBIs under this new categorization serves as a useful inventory for local governments when looking for new approaches to implementing sustainability goals.

## **3. Research Design and Methods**

A multi-phase research design was used to develop the categorization of MBIs for SCP implementation. The first phase concentrated on constructing the framework. The second phase consisted of two in-depth case studies for refining and assessing the usability of the new categorization in SCP implementation.

### *3.1. Phase One: Construction of the New MBI Categorization Framework*

Phase one focused on identifying and categorising MBIs appropriate for use in a framework designed to support SCP implementation at the local level. A list of existing

and emerging MBIs was created by searching both academic and grey literature. The objective of this step was to create a preliminary list of all possible MBIs, based on the following criteria:

- Intended for the use of environmental topics and goals covered in the SCP (in Table 1);
- Could be controlled by local governments, with a city, municipal, or regional focus; and
- Applicable in the context of Ontario, Canada.

Once all the MBIs had been identified from the literature, they were separated into a range of environmental topics (i.e., transportation, water, waste, air, energy, land use, climate change, ecological diversity, and food security) covered in the SCPs, based on the function, intended use, and area of impact of the MBIs [23]. For example, stormwater charges, a user fee for stormwater management, is categorized under the water topic. If an MBI fitted more than one topic, it was repeated in each one. If there were sub-topics under each larger environmental topic, the MBIs were then categorized under the associated sub-topics. Finally, MBIs were classified based on their MBI type (i.e., price-based, rights-based, market friction reduction, and government subsidy reduction).

These topics are framed under environment due to their dependence on nature, and interaction and engagement with the surrounding natural environment. Though referred to as environmental topics, they are also interdependent on society and the economy as sustainability is based on the unison of the three pillars of sustainable development: environmental, social, and economic.

### 3.2. Phase Two: Pilot Municipalities for Data Collection

The theoretical framework and the municipal implementation of the MBIs were of equal importance. Thus, two Canadian municipalities were chosen as pilot municipalities for data collection to enhance the accuracy and validity of the results [68]. The City of Kingston and the Region of Waterloo (which includes the cities of Kitchener, Waterloo, and Cambridge) were selected based on the following criteria:

- Geographic boundary: within Ontario, Canada;
- Sustainable community planning: have adopted some form of SCP (based on the records from the Canadian Sustainability Plan Inventory);
- Size and scale: have a population of over 100,000 (based on information listed in the Census of Population by Statistics Canada) and similar in size;
- Similar in their plan characteristics: display similarities between the two municipalities in terms of the age or the time horizon of the plans and are at least 2–3 years into the plan-implementation stage;
- Commitment: display strong interest and willingness to participate in the research;
- Variety in governance structure: one municipality represents a two-tier municipal structure (Region of Waterloo), while the other represents a single-tier municipality (City of Kingston). This ensures the framework will be relevant to both types.

Moreover, both municipalities demonstrate strong leadership in sustainable community development. They have carried out multiple sustainability initiatives and have received awards and recognitions for their sustainability efforts.

A half-day focus group was held with each municipality for data collection. The choice of focus group participants was made based on their role and influence on sustainability planning within the municipality. Participants needed to hold direct influence over sustainability planning and SCP implementation in their community and some of the roles included planners, managers, and other municipal staff. The invite was originally sent to sustainability managers, and they invited related colleagues to participate. The sustainability manager for each local government included lower and upper tier municipalities participating along with a community-wide sustainability director and other key municipal staff responsible for MBIs. Thus, they were experts in the implementation tools and strategies (including MBIs) used for their SCPs.

Overall, the aim of the focus group sessions was to analyse the suite of MBIs and the associated categorization with the participants and gather feedback for improving accuracy and usability. During the session, each MBI was discussed in detail. The participants were invited to provide oral and written feedback about the categorization of MBIs for SCP implementation. More specifically, responses were gathered to the following questions:

- Are the sub-topics for the environmental topics appropriate? What are some other good sub-classifications?
- Are the MBIs relevant to municipalities? Are any MBIs missing or beyond your municipal jurisdiction?

Through both focus group sessions, the Chatham House Rule was utilized. As outlined by the rule, participants were invited to freely use the information that originated from the discussion but were not allowed to reveal the identity of the commenter. This rule promotes an environment for open and secure discussion, while ensuring that commenters remained anonymous.

### 3.3. Finalizing the Categorization of MBIs for SCP Implementation

The list of MBIs from phase one outlined in Section 3.1 was modified and improved after the aforementioned focus group sessions. The final list of MBIs is presented in Tables 3–10 of the results section. The modified categorization improves the clarification of MBIs and presents the MBIs as policy instruments for implementing SCPs. Next, the MBIs were also aligned with associated environmental SDG targets. The final version contains over 50 MBIs across 8 different environmental topics, and it relates the MBIs with 12 environmentally related SDG goals.

## 4. Results

Specific MBIs can help with the implementation of different environmental objectives. The following table (Table 3) presents the details of the suite of MBIs for SCP implementation, and these MBIs are further divided based on the following types:

- Price-based MBIs and subsidies;
- Rights-based MBIs;
- ◆ Market friction reduction MBIs.

Table 3 consists of four different columns cross-referencing different MBIs with common environmental topics and sub-topics in SCPs, as well as the SDG targets with an environmental focus and relevance on a local/regional level. The framework was designed to assess municipal market signals and identify the potential MBIs that could help improve the implementation of the SCPs and achieve SDGs through a local lens. Tables 3–10 present the categorization of MBIs for SCP and SDG implementation for each of the environmental topics. The MBIs within each environmental topic that do not fall within specific sub-topics are grouped under other.

Transportation plays an important role in the lives of urban commuters and is the top concern for communities. Table 3 showcases the set of MBIs for implementing the transportation goals and actions identified in a SCP, as well as SDGs related to transportation.

Water is ranked second in priority among Canadian municipalities. Table 4 presents the set of MBIs for achieving SDGs related to water and SCPs pertaining to water quality, consumption, source, etc.

Market-based instruments encourage both source reduction and waste diversion activity. Table 5 showcases the set of MBIs for implementing the solid waste goals and actions identified in a SCP, as well as the SDGs related to waste.

Table 6 showcases the set of MBIs for implementing energy goals identified in an SCP. These also have indirect effect on air quality. These two are combined in one table because municipal governments do not have an air quality department. SDG targets related to air quality and energy were also identified.

Table 7 presents MBIs pertaining to municipal land use, as well as land use related SDG targets.

Climate change related MBIs are highlighted in Table 8. MBIs for both mitigation and adaptation are presented.

Though food security is not among the priorities in SCPs worldwide, it remains an important topic for Canadian communities. Table 9 presents MBIs for food security related SCP goals and SDG targets.

Market-Based Instruments for community level biodiversity can be considered a relatively new and innovative concept. Hence, Table 10 presents MBIs pertaining to ecological diversity SCPs goals and SDGs targets.

**Table 3.** Categorization of MBIs for Transportation and Related SDG Implementation.

| Topics         | Sub-Topics                       | MBIs   | SDG Targets [69]  |
|----------------|----------------------------------|--|---|
| Transportation | Modal split                      | <ul style="list-style-type: none"> <li>■ Anti-idling charges</li> <li>◆ Carpool subsidies</li> <li>■ Congestion fees</li> <li>◆ Environmental labels</li> <li>◆ Hybrid/EV parking spaces</li> <li>• Licensed commercial parking space</li> <li>■ Parking pricing</li> <li>◆ Peak-period licensing</li> </ul> | “Target 11.2: By 2030, provide access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities, and older persons.”  |
|                | Active and public transportation | <ul style="list-style-type: none"> <li>■ Bike parking subsidies</li> <li>■ Public transit pass subsidies</li> <li>■ Public transit pricing</li> <li>■ Subsidized security for cycling</li> </ul>   | <p>“Target 9.1: Develop quality, reliable, sustainable, and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.”</p> <p>“Target 11.2: By 2030, provide access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities, and older persons.”</p>  |
|                | Other                            | <ul style="list-style-type: none"> <li>◆ Education programs</li> <li>◆ Green public procurement</li> <li>◆ Other funds, grants, and subsidies</li> <li>◆ Partnership</li> <li>◆ Reporting requirements</li> <li>◆ Scrappage incentives</li> </ul>  | <p>“Target 4.7: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity, and of culture’s contribution to sustainable development.”</p> <p>“Target 12.7: Promote public procurement practices that are sustainable, in accordance with national policies and priorities.”</p> <p>“Target 16.b: Promote and enforce non-discriminatory laws and policies for sustainable development.”</p> <p>“Target 17.14: Enhance policy coherence for sustainable development.”</p> <p>“Target 17.17: Encourage and promote effective public, public-private, and civil society partnerships, building on the experience and resourcing strategies of partnerships data, monitoring and accountability.”</p> |

**Table 4.** Categorization of MBIs for Water and Related SDG Implementation.

| Topics                                      | Sub-Topics                                      | MBIs  | SDG Targets [69]   |
|---|---|---|--|
| Water (including wastewater and Stormwater) | Water quality                                   | <ul style="list-style-type: none"> <li>■ BOD loads Charges</li> <li>◆ Certification (e.g., smart salt application)</li> <li>■ Incentive for bio-swales</li> <li>■ Nitrogen levy</li> <li>■ Phosphorous levy</li> <li>◆ Stormwater Management</li> <li>■ TSS charges</li> <li>• Water quality permit trading</li> <li>◆ Water quality program</li> </ul> | <p>“Target 6.3: By 2030, improve water quality by reducing pollution, eliminating dumping, and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse globally.”</p> <p>“Target 11.5: By 2030, significantly reduce the number of deaths and the number of people affected, and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.”</p> <p>“Target 12.4: By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water, and soil in order to minimize their adverse impacts on human health and the environment.”</p>                |
|   | Water consumption and wastewater treatment      | <ul style="list-style-type: none"> <li>■ Rain barrel subsidies</li> <li>■ Stormwater charges</li> <li>◆ Stormwater Management</li> <li>■ Water pricing</li> <li>■ Water rebates</li> <li>◆ Water, wastewater treatment infrastructure funds</li> </ul>  | <p>“Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all.”</p> <p>“Target 6.4: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.”</p> <p>“Target 9.1: Develop quality, reliable, sustainable, and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.”</p> <p>“Target 9.4: By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.”</p> |
|   | Water source (ground water and surface sources) | <ul style="list-style-type: none"> <li>◆ Water source protection incentive programs or policy</li> </ul>  | <p>“Target 6.6: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes.”</p> <p>“Target 12.2: By 2030, achieve the sustainable management and efficient use of natural resources.”</p> <p>“Target 15.1: By 2020, ensure the conservation, restoration, and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains, and drylands, in line with obligations under international agreements.”</p>   |

Table 4. Cont.

| Topics | Sub-Topics | MBIs  | SDG Targets [69]   |
|--------|------------|---|--|
|        | Other      | <ul style="list-style-type: none"> <li>◆ Education programs</li> <li>◆ Green public procurement</li> <li>■ Other funds, grants, and subsidies</li> <li>◆ Partnership</li> <li>◆ Reporting requirements</li> </ul> | <p>“Target 4.7: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity, and of culture’s contribution to sustainable development.”</p> <p>“Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.”</p> <p>“Target 6.b: Support and strengthen the participation of local communities in improving water and sanitation management.”</p> <p>“Target 12.7: Promote public procurement practices that are sustainable, in accordance with national policies and priorities.”</p> <p>“Target 12.8: By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.”</p> <p>“Target 16.b: Promote and enforce non-discriminatory laws and policies for sustainable development.”</p> <p>“Target 17.14: Enhance policy coherence for sustainable development.”</p> <p>“Target 17.17: Encourage and promote effective public, public-private, and civil society partnerships, building on the experience and resourcing strategies of partnerships data, monitoring, and accountability.”</p> |

**Table 5.** Categorization of MBIs for Waste and Related SDG Implementation.

| Topics      | Sub-Topics        | MBIs   | SDG Targets [69]   |
|-------------|-------------------|--|--|
| Solid Waste | Waste diversion   | <ul style="list-style-type: none"> <li>● Bag tag program</li> <li>◆ Environmental choice label</li> <li>◆ Product labeling requirements</li> <li>■ Scrappage incentives</li> <li>■ Subsidies for reusable water bottle</li> <li>■ Waste pricing</li> </ul> | <p>“Target 12.3: By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.”</p> <p>“Target 12.4: By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water, and soil in order to minimize their adverse impacts on human health and the environment.”</p> <p>“Target 12.5: By 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse.”</p>  |
|             | Waste disposal    | <ul style="list-style-type: none"> <li>◆ Organic waste and bio-solids management programs</li> <li>◆ Residential disposal programs for high density buildings and neighbourhoods</li> <li>◆ Tipping fees for residential wastes</li> </ul>                 | <p>“Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.”</p>  |
|             | Energy from waste | <ul style="list-style-type: none"> <li>◆ District energy programs</li> <li>◆ Waste for thermal heating and fuels funds</li> </ul>  | <p>“Target 9.1: Develop quality, reliable, sustainable, and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.”</p>   |
|             | Other             | <ul style="list-style-type: none"> <li>◆ Green public procurement</li> <li>■ Other funds, grants, and subsidies</li> <li>◆ Partnership</li> <li>◆ Reporting requirements</li> </ul>  | <p>“Target 12.7: Promote public procurement practices that are sustainable, in accordance with national policies and priorities.”</p> <p>“Target 12.8: By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.”</p> <p>“Target 16.b: Promote and enforce non-discriminatory laws and policies for sustainable development.”</p> <p>“Target 17.14: Enhance policy coherence for sustainable development.”</p> <p>“Target 17.17: Encourage and promote effective public, public-private, and civil society partnerships, building on the experience and resourcing strategies of partnerships data, monitoring, and accountability.”</p> |

**Table 6.** Categorization of MBIs for Air Quality and Energy, and Related SDG Implementation.

| Topics                 | Sub-Topics  | MBIs  | SDG Targets [69]   |
|------------------------|---|---|--|
| Air Quality and Energy | Energy source                                       | <ul style="list-style-type: none"> <li>◆ District energy program</li> <li>◆ Environmental label</li> <li>◆ Micro-fit program</li> <li>◆ Renewable energy/district energy subsidies</li> </ul>                     | <p>“Target 7.1: By 2030, ensure universal access to affordable, reliable, and modern energy services.”</p> <p>“Target 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix.”</p> <p>“Target 9.1: Develop quality, reliable, sustainable, and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.”</p> <p>“Target 9.4: By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.”</p>   |
|                        | Energy consumption, distribution, and air emissions | <ul style="list-style-type: none"> <li>■ Anti-idling development charges</li> <li>■ Anti-idling pay-per-use charges</li> <li>◆ Energy distribution zones</li> <li>◆ Utilities Pricing (gas)</li> </ul>            | <p>“Target 7.3: By 2030, double the global rate of improvement in energy efficiency.”</p> <p>“Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.”</p> <p>“Target 12.4: By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water, and soil in order to minimize their adverse impacts on human health and the environment.”</p>  |
|                        | Other   | <ul style="list-style-type: none"> <li>◆ Education programs</li> <li>◆ Green public procurement</li> <li>■ Other funds, grants, and subsidies</li> <li>◆ Partnership</li> <li>◆ Reporting requirements</li> </ul> | <p>“Target 4.7: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity, and of culture’s contribution to sustainable development.”</p> <p>“Target 12.7: Promote public procurement practices that are sustainable, in accordance with national policies and priorities.”</p> <p>“Target 12.8: By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.”</p> <p>“Target 16.b: Promote and enforce non-discriminatory laws and policies for sustainable development.”</p> <p>“Target 17.14: Enhance policy coherence for sustainable development.”</p> <p>“Target 17.17: Encourage and promote effective public, public-private, and civil society partnerships, building on the experience and resourcing strategies of partnerships data, monitoring, and accountability.”</p> |

**Table 7.** Categorization of MBIs for Land Use and Related SDG Implementation.

| Topics   | Sub-Topics                | MBIs   | SDG Targets [69]  |
|----------|---------------------------|--|---|
| Land Use | Land property development | <ul style="list-style-type: none"> <li>◆ Alternate transportation demand management for new development</li> <li>■ Anti-idling development charges</li> <li>■ Density bonus</li> <li>■ Density-based property tax</li> <li>■ Environmental assessment incentives</li> <li>■ Land-value taxation</li> <li>◆ Tax increment financing (i.e., Brownfield)</li> </ul> | <p>“Target 6.6: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes.”</p> <p>“Target 11.a: Support positive economic, social and environmental links between urban, per-urban, and rural areas by strengthening national and regional development planning.”</p> <p>“Target 14.1: By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.”</p> <p>“Target 15.9: By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies, and accounts.”</p>  |
|          | Green Spaces              | <ul style="list-style-type: none"> <li>■ Environmental land acquisition</li> <li>■ Land trust</li> <li>■ Payment for ecological services</li> <li>■ Tax relief for natural areas (forest stewardship)</li> <li>◆ Tree cultivation/conservation program</li> <li>◆ Urban canopy incentives</li> </ul>   | <p>“Target 11.4: Strengthen efforts to protect and safeguard the world’s cultural and natural heritage.”</p> <p>“Target 11.7: By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons, and persons with disabilities.”</p>  |
|          | Other                     | <ul style="list-style-type: none"> <li>◆ Education programs</li> <li>◆ Green public procurement</li> <li>■ Other funds, grants, and subsidies</li> <li>◆ Partnership</li> <li>■ Reporting requirements</li> </ul>  | <p>“Target 4.7: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity, and of culture’s contribution to sustainable development.”</p> <p>“Target 11.3: By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated, and sustainable human settlement planning and management in all countries.”</p> <p>“Target 12.7: Promote public procurement practices that are sustainable, in accordance with national policies and priorities.”</p> <p>“Target 12.8: By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.”</p> <p>“Target 16.b: Promote and enforce non-discriminatory laws and policies for sustainable development.”</p> <p>“Target 17.14: Enhance policy coherence for sustainable development.”</p> <p>“Target 17.17: Encourage and promote effective public, public-private, and civil society partnerships, building on the experience and resourcing strategies of partnerships data, monitoring, and accountability.”</p> |

**Table 8.** Categorization of MBIs for Climate Change and Related SDG Implementation.

| Topics                    | Sub-Topics  | MBIs   | SDG Targets [69]   |
|---------------------------|---|--|--|
| Climate Change            | Mitigation  | ■ Anti-idling development charges              | “Target 12.8: By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.”   |
|                           |   | ■ Anti-idling pay-per-use charges              | “Target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning.”  |
|                           |   | ◆ Green public procurement                     | “Target 16.b: Promote and enforce non-discriminatory laws and policies for sustainable development.”   |
|                           |   | ■ Other funds, grants, and subsidies           | “Target 17.14: Enhance policy coherence for sustainable development.”  |
|                           |   | ◆ Partnership                                  | “Target 17.17: Encourage and promote effective public, public-private, and civil society partnerships, building on the experience and resourcing strategies of partnerships data, monitoring, and accountability.”   |
|                           |   | ■ Renewable energy / district energy subsidies |  |
|                           |   | ◆ Reporting requirements                       |  |
|                           | Adaptation  | ■ Bio-swales incentives                        | “Target 1.5: By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social, and environmental shocks and disasters.”   |
|                           |   | ■ Environmental infrastructure funds           | “Target 11.b: By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, and resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels.” |
|                           |   | ◆ Green public procurement                     | “Target 12.7: Promote public procurement practices that are sustainable, in accordance with national policies and priorities.”   |
|                           |   | ■ Other funds, grants, and subsidies           | “Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.”  |
|                           |   | ◆ Partnership                                  | “Target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.”   |
|                           |   | ◆ Reporting requirements                       | “Target 16.b: Promote and enforce non-discriminatory laws and policies for sustainable development.”   |
|                           |   | ◆ Storm water management                       | “Target 17.14: Enhance policy coherence for sustainable development.”  |
| ■ Urban canopy incentives | “Target 17.17: Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships data, monitoring, and accountability.” |  |  |

**Table 9.** Categorization of MBIs for Food Security and Related SDG Implementation.

| Topics        | Sub-Topics | MBIs  | SDG Targets [69]  |
|---------------|------------|---|---|
| Food Security |            | <ul style="list-style-type: none"> <li>■ Agro-environmental subsidies</li> <li>◆ Environmental label</li> <li>■ Farm subsidies</li> <li>■ Fertilizer tax</li> <li>◆ Green public procurement</li> <li>■ Land drainage grants</li> <li>■ Land use pricing (i.e., aggregate land use vs. lands for farming)</li> <li>■ Nitrogen levy</li> <li>■ Other funds, grants, and subsidies</li> <li>◆ Partnership</li> <li>■ Phosphorous levy</li> <li>◆ Public and education events</li> <li>◆ Subsidies for local food markets</li> </ul> | <p>“Target 2.4: By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding, and other disasters, and that progressively improve land and soil quality.”</p> <p>“Target 4.7: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity, and of culture’s contribution to sustainable development.”</p> <p>“Target 12.3: By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.”</p> <p>“Target 12.4: By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water, and soil in order to minimize their adverse impacts on human health and the environment.”</p> <p>“Target 12.7: Promote public procurement practices that are sustainable, in accordance with national policies and priorities.”</p> <p>“Target 12.8: By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.”</p> <p>“Target 14.1: By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.”</p> <p>“Target 15.1: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains, and drylands, in line with obligations under international agreements.”</p> <p>“Target 16.b: Promote and enforce non-discriminatory laws and policies for sustainable development.”</p> <p>“Target 17.14: Enhance policy coherence for sustainable development.”</p> <p>“Target 17.17: Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships data, monitoring, and accountability.”</p> |

**Table 10.** Categorization of MBIs for Ecological Diversity and Related SDG Implementation.

| Topics               | Sub-Topics | MBIs  | SDG Targets [69]   |
|----------------------|------------|---|--|
| Ecological Diversity |            | <ul style="list-style-type: none"> <li>■ Agro-environmental subsidies</li> <li>◆ Awards and recognition program</li> <li>◆ Environmental choice label</li> <li>■ Environmental fund</li> <li>■ Environmental land acquisition</li> <li>◆ Green public procurement</li> <li>■ Land trust</li> <li>■ Other funds, grants, and subsidies</li> <li>◆ Partnership</li> <li>■ Payment for ecological services</li> <li>◆ Reporting requirements</li> <li>■ Tax relief for natural areas (forest stewardship)</li> <li>◆ Tree cultivation/conservation program</li> <li>◆ Urban canopy incentives</li> </ul> | <p>“Target 4.7: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity, and of culture’s contribution to sustainable development.”</p> <p>“Target 6.6: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes.”</p> <p>“Target 11.4: Strengthen efforts to protect and safeguard the world’s cultural and natural heritage.”</p> <p>“Target 12.2: By 2030, achieve the sustainable management and efficient use of natural resources.”</p> <p>“Target 12.7: Promote public procurement practices that are sustainable, in accordance with national policies and priorities.”</p> <p>“Target 12.8: By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.”</p> <p>“Target 14.1: By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.”</p> <p>“Target 14.2: By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.”</p> <p>“Target 14.3: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.”</p> <p>“Target 15.3: By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought, and floods, and strive to achieve a land degradation-neutral world.”</p> <p>“Target 15.4: By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development.”</p> <p>“Target 15.5: Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.”</p> <p>“Target 15.9: By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies, and accounts.”</p> <p>“Target 15.a: Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems.”</p> <p>“Target 16.b: Promote and enforce non-discriminatory laws and policies for sustainable development.”</p> <p>“Target 17.14: Enhance policy coherence for sustainable development.”</p> <p>“Target 17.17: Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships data, monitoring, and accountability.”</p> |

## 5. Discussion

The paper presents a novel categorization framework that aligns MBIs with environmentally related topics that are commonly found in SCPs in Canada and worldwide. The various MBI categorization frameworks presented in previous studies have benefits and drawbacks [12,16,40]. However, these categories of MBIs are created without the intention of using them as means to achieve local sustainable development or toward localizing the environmentally related SDG targets. These categorizations have an economic focus and do not align the potential benefits with environmentally related outcomes. It became clear that these existing categorizations of MBIs and the topics in SCPs are vastly different, and there is a lack of consideration of the potential of these MBIs for local sustainable development. If MBIs are to be used for sustainability purposes, then perhaps they should be characterized in a new and different manner to capture the sustainability co-benefits, as offered in this paper.

This framework for categorizing MBIs extends the existing categorization of priced-based, rights-based, and friction reduction instruments by further separating each MBI by their environmental objectives and the intended environmental sustainability outcomes. Hence, each MBI is clearly linked with the associated environmental topics and subtopics in a SCP. In addition, SDG targets with relevance to local level progress and an environmental focus are also cross-identified with the corresponding SCP topics and MBIs in this framework, creating a lexicon for localizing SGDs and advancing local progress toward achieving sustainable development.

The research is designed to help with the implementation of local environmental sustainability goals and the list of MBIs identified is comprehensive. The compilation of MBIs with a local focus for sustainable development is the novel contribution, and this framework is revalidated through focus groups. There is a great deal of overlap between the MBIs identified in previous studies [12,16,39,40,45] and those obtained from the focus groups. In addition, many of the MBIs that were brought up during the focus groups have been individually discussed in other studies [42,44,49–51]. Reflected in Tables 3–10, a variety of market friction reduction instruments were identified by the focus group to be applicable at the local level. Although many price-based instruments were found also applicable locally, they are mainly user fee/charges and subsidies due to the limitations in the local legislative power and authority [64]. This also contributes to the lack of implementable rights-based instruments from the local governments since the legislative powers of Canadian municipalities are on the weaker side of the continuum of local empowerment [66]. Hence, this study verifies the MBIs existing at the local level and identifies higher-level MBIs that are also applicable to the local level.

The new categorization of MBIs aligns with those topics found in specific SCPs to improve the usefulness for which it was designed. Of the 16 topics most commonly covered in the SCPs of Canadian communities, environmental topics are among the top 10 most frequently found in Canadian SCPs [13]. The changes between the topics found in SCPs and the new MBI categorization were very subtle. The results of the focus groups indicate that none of the topics were to be excluded from the final categorization framework. The changes only include combining air and energy topics. Canadian municipalities, with the exception of charter cities such as Toronto, only have limited authorities over MBIs for air topics. Thus, most of the MBIs under the initial air section are not appropriate at the local level. From the focus group feedback, sub-topics were also developed for each topic in order to improve the usefulness of the new categorization. There were more modifications to the sub-topics, especially in the transportation section. Overall, the results yielded an acceptance of these topics and sub-topics for the new categorization of MBIs for SCP implementation.

It is important to note that there is an extremely diverse array of potential MBIs that could be used to accelerate sustainable community development [12,16,39,40,45]. However, the simple categories presented in the previous literature mainly focus on the economic dimension of MBIs and often lack direct alignment with the environmental objectives in

the SCPs. The advantage of the new categorization is that this matrix framework creates direct links between MBIs (economic dimension) and the environmental objectives in the SCPs. Since the type of MBI is identified using three unique bullets, the user is able to pinpoint the appropriate MBIs (both pricing and non-pricing options) to implement certain environmental objectives in an SCP. Moreover, the framework allows the user to accurately locate and pinpoint the appropriate MBIs for implementing related SDG targets. Local governments often operate in silos, and they are often compartmentalized based on their responsibilities and have locational strategies [51]. Thus, the framework could stimulate an increase in inter-departmental users and the usability of market mechanisms for community sustainability.

All the participants from the focus groups also expressed acceptance of this categorization framework. Many participants thought that this framework would be beneficial for implementing SCPs. The findings from the focus groups reinforced the assertions for a new categorization framework that emphasizes sustainable community development. Hence, this new categorization fairly considered MBIs for SCP implementation, and the development of such tools has the potential to lead to changes in sustainability practice at the local scale. In addition to helping achieve local sustainable development, by doing so, municipalities also help implement the SDGs. We show how environmental sustainability goals in the SCPs align with environmental MBIs, and also specific SDG targets.

The relevance of this categorization framework of MBIs extends beyond Canada, as environmentally related topics are common among SCPs worldwide. Additionally, localizing the SDGs is a priority in Agenda 2030 and can be supported through the implementation of MBIs in communities worldwide. The MBIs presented in this paper have local relevance with the aim of furthering the implementation of environmentally related goals of the SCPs and SDG targets at the local level. The extent of usability and relevance of the MBIs will depend on the legislative law systems of the local government and the relationships of power with the state. The range of MBIs for implementation will be more restrictive for those communities that are fully dependent on the state compared to those with full autonomy and legislative power [66]. Nonetheless, the MBIs under this novel categorization will be applicable in other countries with the caveat that the legislative jurisdictions have to be considered for implementation.

## 6. Considerations for Policymakers and Future Research

Although MBIs have become prominent in sustainability, research in this area is often scattered. Most studies either focus on specific MBIs or lack a local focus. Thus, a larger collection of data on such instruments is needed in order to better inform decision-making for community sustainability and serve as a foundation for future research in this area. This paper helps bridge this gap in the literature as it focuses on the development of a new MBI categorization that considers the potential uses of MBIs for implementing SCP goals to influence better decision-making for sustainable development at the local level.

The new categorization of MBIs for SCP implementation builds on existing literature to improve our understanding of MBIs that are applicable at the local level and provides alternative implementation options for SCPs. This comprehensive categorization framework offers a significant platform for multidisciplinary research, as it allows researchers to understand the usefulness of MBIs from different perspectives. Furthermore, the suite of MBIs for local-level implementation provides researchers and practitioners, especially municipal decision-makers and influencers, with a list of MBIs that helps to achieve the environmental objectives in SCPs and localize the SDGs. Overall, the suite of MBIs under the new categorization increases awareness and knowledge of MBIs as a means to achieve community sustainability.

The paper provides the foundation for potential future interdisciplinary research in the area of MBIs and sustainability development. Future researchers in the environmental and sustainability fields could explore the effects of implementing SCPs through MBIs for cities with other geographic or population characteristics, such as analyzing the effect

of MBIs for implementing SCPs and SDG targets in municipalities in both developed and developing countries. Additionally, future research is necessary to understand the long-term environmental, social, and economic outcomes of such an implementation approach. Another topic could be the relevance of MBIs to smart cities and an exploration of how MBIs can aid the smart urban transition. Moreover, this paper primarily focused on environmental topics as they are among the topic most highly prioritized topics in Canadian and world-wide SCPs; future research exploring the MBIs for more social topics, another important component of sustainable development, would also contribute positively to the market approach to local sustainable development.

**Author Contributions:** Conceptualization, S.C., A.C. and Y.Z.; Formal analysis, Y.Z.; Funding acquisition, S.C. and A.C.; Methodology, Y.Z., A.C. and S.C.; Project administration, A.C.; Supervision, A.C. and S.C.; Validation, Y.Z., A.C. and Stephanie Cairns; Visualization, Y.Z.; Writing—original draft, Y.Z.; Writing—review & editing, Y.Z. and A.C. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by Metcalf Foundation.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Informed consent was obtained from all participants involved in the study.

**Data Availability Statement:** Not applicable.

**Conflicts of Interest:** The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

## References

1. World Commission on Environment and Development. *Our Common Future*; Oxford University Press: Oxford, UK, 1987; ISBN 978-0-19-282080-8.
2. Mebratu, D. Sustainability and Sustainable Development: Historical and Conceptual Review. *Environ. Impact Assess. Rev.* **1998**, *18*, 493–520. [[CrossRef](#)]
3. Barber, J. The Sustainable Communities Movement. *J. Environ. Dev.* **1996**, *5*, 338–348. [[CrossRef](#)]
4. Kitchen, T.; Whitney, D.; Littlewood, S. Local Authority/Academic Collaboration and Local Agenda 21 Policy Processes. *J. Environ. Plan. Manag.* **1997**, *40*, 645–660. [[CrossRef](#)]
5. Corbiere-Nicollier, T.; Ferrari, Y.; Jemelin, C.; Jolliet, O. Assessing Sustainability: An Assessment Framework to Evaluate Agenda 21 Actions at the Local Level. *Int. J. Sustain. Dev. World Ecol.* **2003**, *10*, 225–337. [[CrossRef](#)]
6. Pedercini, M.; Zuellich, G.; Dianati, K.; Arquitt, S. Toward Achieving Sustainable Development Goals in Ivory Coast: Simulating Pathways to Sustainable Development. *Sustain. Dev.* **2018**, *26*, 588–595. [[CrossRef](#)]
7. Benedek, J.; Ivan, K.; Török, I.; Temerde, A.; Holobăcă, I.H. Indicator-based Assessment of Local and Regional Progress Toward the Sustainable Development Goals (SDGs), An Integrated Approach from Romania. *Sustain. Dev.* **2021**, *29*, 860–875. [[CrossRef](#)]
8. Xue, L.; Weng, L.; Yu, H. Addressing Policy Challenges in Implementing Sustainable Development Goals through an Adaptive Governance Approach: A View from Transitional China. *Sustain. Dev.* **2018**, *26*, 150–158. [[CrossRef](#)]
9. Roseland, M. Sustainable Community Development: Integrating Environmental, Economic, and Social Objectives. *Prog. Plan.* **2000**, *54*, 73–132. [[CrossRef](#)]
10. Berke, P.R.; Conroy, M.M. Are We Planning for Sustainable Development? An Evaluation of 30 Comprehensive Plans. *J. Am. Plan. Assoc.* **2000**, *66*, 21–33. [[CrossRef](#)]
11. Clarke, A.; Erfan, A. Regional Sustainability Strategies: A Comparison of Eight Canadian Approaches. *Plan Can.* **2007**, *47*, 15–18.
12. Hendrickson, D.J.; Lindberg, C.; Connelly, S.; Roseland, M. Pushing the Envelope: Market Mechanisms for Sustainable Community Development. *J. Urban.* **2011**, *4*, 153–173. [[CrossRef](#)]
13. MacDonald, A.; Clarke, A.; Huang, L.; Roseland, M.; Seitanidi, M.M. Multi-Stakeholder Partnerships (SDG #17) as a Means of Achieving Sustainable Communities and Cities (SDG #11). In *Handbook of Sustainability Science and Research*; Leal, W., Ed.; Springer: Cham, Switzerland, 2018; pp. 193–209. ISBN 978-3-319-63007-6.
14. Gahin, R.; Veleva, V.; Hart, M. Do Indicators Help Create Sustainable Communities? *Local Environ.* **2003**, *8*, 661–666. [[CrossRef](#)]
15. Parkinson, S.; Roseland, M. Leaders of the Pack: An Analysis of the Canadian ‘Sustainable Communities’ 2000 Municipal Competition. *Local Environ.* **2002**, *7*, 411–429. [[CrossRef](#)]

16. Stavins, R.N. Experience with Market-Based Environmental Policy Instruments. In *Handbook of Environmental Economics: Environmental Degradation and Institutional Responses*; Mäler, K., Vincent, J., Eds.; Elsevier: Amsterdam, The Netherlands, 2003; pp. 355–435. ISBN 0-444-50063-4.
17. Alebon, K.; Klinsky, S. *Local Governments' Response to Agenda 21: Summary Report of Local Agenda 21 Survey with Regional Focus*; International Council for Local Environmental Initiatives (ICLEI): Toronto, ON, Canada, 2002.
18. Connelly, S. Local Agenda 21: International Council for Local Environmental Initiatives. In *Encyclopedia of Quality of Life and Well-Being Research*; Michalos, A., Ed.; Springer: Dordrecht, The Netherlands, 2014; pp. 3670–3673. ISBN 978-94-007-0753-5.
19. United Nations Transforming Our World: The 2030 Agenda for Sustainable Development. Available online: <https://sdgs.un.org/2030agenda> (accessed on 11 February 2022).
20. Ordóñez-Ponce, E.; Clarke, A.; MacDonald, A. Business Contributions to the Sustainable Development Goals through Community Sustainability Partnerships. *Sustain. Account. Manag. Policy J.* **2021**, *12*, 1239–1267. [[CrossRef](#)]
21. Parenteau, R. Local Action Plans for Sustainable Communities. *Environ. Urban.* **1994**, *6*, 183–199. [[CrossRef](#)]
22. Clarke, A.; MacDonald, A. *Partner Engagement for Community Sustainability: Supporting Sustainable Development Initiatives by Reducing Friction in the Local Economy*; Sustainable Prosperity: Ottawa, ON, Canada, 2012; pp. 1–14.
23. Clarke, A.; Huang, L.; Roseland, M.; Chen, H. Do Collaborative Planning Processes Lead to Better Outcomes? An Examination of Cross-Sector Social Partnerships for Community Sustainability. Presented at Administrative Science Association of Canada Conference Paper and Presentation. In Proceedings of the Administrative Sciences Association of Canada, Muskoka, ON, Canada, 9–12 May 2014.
24. Sun, X.; Clarke, A.; MacDonald, A. Implementing Community Sustainability Plans through Partnerships: An Examination of the Relationship between Partnership Structural Features and Climate Change Mitigation Plan Outcomes. *Sustainability* **2020**, *12*, 6172. [[CrossRef](#)]
25. Roseland, M. *Toward Sustainable Communities: Solutions for Citizens and Their Governments*, 4th ed.; New Society Publishers: Gabriola Island, BC, Canada, 2012; ISBN 978-1-55092-506-7.
26. Williamson, I.P. Land Administration Best Practice Providing the Infrastructure for Land Policy Implementation. *Land Use Policy* **2001**, *18*, 297–307. [[CrossRef](#)]
27. Villamayor-Tomas, S.; Thiel, A.; Amblard, L.; Zikos, D.; Blanco, E. Diagnosing the Role of the State for Local Collective Action: Types of Action Situations and Policy Instruments. *Environ. Sci. Policy* **2019**, *97*, 44–57. [[CrossRef](#)]
28. Myeong, S.; Park, J.; Lee, M. Research Models and Methodologies on the Smart City: A Systematic Literature Review. *Sustainability* **2022**, *14*, 1687. [[CrossRef](#)]
29. Silva, B.N.; Khan, M.; Han, K. Towards Sustainable Smart Cities: A Review of Trends, Architectures, Components, and Open Challenges in Smart Cities. *Sustain. Cities Soc.* **2018**, *38*, 697–713. [[CrossRef](#)]
30. Quijano, A.; Hernández, J.L.; Nouaille, P.; Virtanen, M.; Sánchez-Sarachu, B.; Pardo-Bosch, F.; Knieiling, J. Towards Sustainable and Smart Cities: Replicable and KPI-Driven Evaluation Framework. *Buildings* **2022**, *12*, 233. [[CrossRef](#)]
31. Irvine, K.N.; Suwanarit, A.; Likitswat, F.; Srilertchaipanij, H.; Ingegno, M.; Kaewlai, P.; Boonkam, P.; Tontisirin, N.; Sahavacharin, A.; Wongwatharapaiboon, J.; et al. Smart City Thailand: Visioning and Design to Enhance Sustainability, Resiliency, and Community Wellbeing. *Urban Sci.* **2022**, *6*, 7. [[CrossRef](#)]
32. Lim, S.B.; Yigitcanlar, T. Participatory Governance of Smart Cities: Insights from e-Participation of Putrajaya and Petaling Jaya, Malaysia. *Smart Cities* **2022**, *5*, 71–89. [[CrossRef](#)]
33. Lim, S.B.; Malek, J.A.; Yussoff, M.F.Y.M.; Yigitcanlar, T. Understanding and Acceptance of Smart City Policies: Practitioners' Perspectives on the Malaysian Smart City Framework. *Sustainability* **2021**, *13*, 9559. [[CrossRef](#)]
34. Ahvenniemi, H.; Huovila, A.; Pinto-Seppä, I.; Airaksinen, M. What Are the Differences between Sustainable and Smart Cities? *Cities* **2017**, *60*, 234–245. [[CrossRef](#)]
35. Boisvert, V.; Méral, P.; Froger, G. Market-Based Instruments for Ecosystem Services: Institutional Innovation or Renovation? *Soc. Nat. Resour.* **2013**, *26*, 1122–1136. [[CrossRef](#)]
36. Zhou, Y.; Clarke, A.; Cairns, S. Building Sustainable Communities through Market Based Instruments. In *Environmental Policy: An Economic Perspective*; Walker, T., Goubran, S., Sprung-Much, N., Eds.; Wiley Blackwell: Hoboken, NJ, USA, 2020; pp. 233–247. [[CrossRef](#)]
37. Piquou, A.C. *The Economics of Welfare*, 1st ed.; Routledge: New Yorks, NY, USA, 2017; ISBN 978-1-35130-436-8.
38. Pirard, R.; Lapeyre, R. Classifying Market-Based Instruments for Ecosystem Services: A Guide to the Literature Jungle. *Ecosyst. Serv.* **2014**, *9*, 106–114. [[CrossRef](#)]
39. Rademaekers, K.; van der Laan, J.; Smith, M.; van Breugel, C.; Pollitt, H. *The Role of Market-Based Instruments in Achieving a Resource Efficient Economy*; European Commission DG Environment: Rotterdam, The Netherlands, 2011; pp. 1–291.
40. Hockenstein, J.B.; Stavins, R.N.; Whitehead, B.W. Crafting the Next Generation of Market-Based Environmental Tools. *Environ. Sci. Policy Sustain. Dev.* **1997**, *39*, 12–33. [[CrossRef](#)]
41. Sargent, J.H. The Economics of Energy and the Environment: The Potential Role of Market-Based Instruments. *Can. United States Law J.* **2002**, *28*, 499–509.
42. Althaus, C.; Tedds, L.M.; McAvoy, A. The Feasibility of Implementing a Congestion Charge on the Halifax Peninsula: Filling the “Missing Link” of Implementation. *Can. Public Policy* **2011**, *37*, 541–561. [[CrossRef](#)]

43. Flachsland, C.; Brunner, S.; Edenhofer, O.; Creutzig, F. Climate Policies for Road Transport Revisited (II), Closing the Policy Gap with Cap-and-Trade. *Energy Policy* **2011**, *39*, 2100–2110. [[CrossRef](#)]
44. Burnett, J. City Buildings-Eco-Labels and Shades of Green! *Landsc. Urban Plan.* **2007**, *83*, 29–38. [[CrossRef](#)]
45. Newell, R.G.; Stavins, R.N. Cost Heterogeneity and the Potential Savings from Market-Based Policies. *J. Regul. Econ.* **2003**, *23*, 43–59. [[CrossRef](#)]
46. Pirard, R. Market-Based Instruments for Biodiversity and Ecosystem Services: A Lexicon. *Environ. Science Policy* **2012**, *19*, 59–68. [[CrossRef](#)]
47. Henderson, B.; Norris, K. Experiences with Market-Based Instruments for Environmental Management. *Australas. J. Environ. Manag.* **2008**, *15*, 113–120. [[CrossRef](#)]
48. Cadman, T.; Eastwood, L.; Michaelis, F.L.C.; Maraseni, T.N.; Pittock, J.; Sarker, T. *The Political Economy of Sustainable Development: Policy Instruments and Market Mechanisms*; Edward Elgar Publishing: Cheltenham, UK, 2015; ISBN 978-1-78347-484-4.
49. Kockelman, K.M.; Kalmanje, S. Credit-Based Congestion Pricing: A Policy Proposal and the Public's Response. *Transp. Res. Part A Policy Pract.* **2005**, *39*, 671–690. [[CrossRef](#)]
50. Mamun, M.S.; Michalaka, D.; Yin, Y.; Lawphongpanich, S. Comparison of Socioeconomic Impacts of Market-Based Instruments for Mobility Management. *Int. J. Sustain. Transp.* **2016**, *10*, 96–104. [[CrossRef](#)]
51. Magrini, C.; D'Addato, F.; Bonoli, A. Municipal Solid Waste Prevention: A Review of Market-Based Instruments in Six European Union Countries. *Waste Manag. Res.* **2020**, *38*, 3–22. [[CrossRef](#)]
52. Straton, A.T.; Heckbert, S.; Ward, J.R.; Smajgl, A. Effectiveness of a Market-Based Instrument for the Allocation of Water in a Tropical River Environment. *Water Resour.* **2009**, *36*, 743–751. [[CrossRef](#)]
53. Cashman, A.; Moore, W. A Market-Based Proposal for Encouraging Water Use Efficiency in a Tourism-Based Economy. *Int. J. Hosp. Manag.* **2012**, *31*, 286–294. [[CrossRef](#)]
54. Filatova, T. Market-Based Instruments for Flood Risk Management: A Review of Theory, Practice and Perspectives for Climate Adaptation Policy. *Environ. Sci. Policy* **2014**, *37*, 227–242. [[CrossRef](#)]
55. Hurlbert, M.A.; Gupta, J. An Institutional Analysis Method for Identifying Policy Instruments Facilitating the Adaptive Governance of Drought. *Environ. Sci. Policy* **2019**, *93*, 221–231. [[CrossRef](#)]
56. Coria, J.; Köhlin, G.; Xu, J. On the Use of Market-Based Instruments to Reduce Air Pollution in Asia. *Sustainability* **2019**, *11*, 4895. [[CrossRef](#)]
57. Klenert, D.; Mattauch, L.; Combet, E.; Edenhofer, O.; Hepburn, C.; Rafaty, R.; Stern, N. Making Carbon Pricing Work for Citizens. *Nat. Clim. Chang.* **2018**, *8*, 669–677. [[CrossRef](#)]
58. Linton, S.; Clarke, A.; Tozer, L. Strategies and Governance for Implementing Deep Decarbonization Plans at the Local Level. *Sustainability* **2021**, *13*, 154. [[CrossRef](#)]
59. Jacobs, M. *The Green Economy: Environment, Sustainable Development and the Politics of the Future*; UBC Press: Vancouver, Canada, 1993.
60. Thompson, D.; Bevan, A. *The Smart Budget Kit: Environmental Pricing Reform for Municipalities*; Sustainable Prosperity: Ottawa, Canada, 2010.
61. Bosquet, B. Environmental Tax Reform: Does It Work? A Survey of the Empirical Evidence. *Ecol. Econ.* **2000**, *34*, 19–32. [[CrossRef](#)]
62. Deslatte, A.; Stokan, E. Sustainability Synergies or Silos? The Opportunity Costs of Local Government Organizational Capabilities. *Public Adm. Rev.* **2020**, *80*, 1024–1034. [[CrossRef](#)]
63. Osborne, D. Reinventing Government. *Public Product. Manag. Rev.* **1993**, *16*, 349–356. [[CrossRef](#)]
64. Tindal, C.R.; Tindal, S.N.; Stewart, K.; Smith, P.J. *Local Government in Canada*, 9th ed.; Nelson Education: Scarborough, ON, Canada, 2017; ISBN 978-0-17-658297-5.
65. Ministry of Justice Constitution Acts, 1867 to 1982. Available online: [https://laws-lois.justice.gc.ca/PDF/CONST\\_TRD.pdf](https://laws-lois.justice.gc.ca/PDF/CONST_TRD.pdf) (accessed on 15 January 2022).
66. Rodriguez, D.B.; Shoked, N. Comparative Local Government Law in Motion: How Different Local Government Law Regimes Affect Global Cities' Bike Share Plans. *Urban Law J.* **2014**, *42*, 123–186.
67. Association of Municipalities Ontario Municipal 101. Available online: <https://www.amo.on.ca/YourAssociation/Municipal101> (accessed on 15 July 2021).
68. Creswell, J.W.; Creswell, J.D. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 5th ed.; SAGE Publications: Thousand Oaks, CA, USA, 2017; ISBN 978-1-50638-670-6.
69. United Nations Department of Economic and Social Affairs The 17 Goals. Available online: <https://sdgs.un.org/goals> (accessed on 15 January 2022).