



Green correction facilities: Lessons from case studies in sustainability in prisons

Walter Leal Filho ^{a,b,c} , Valdemiro Rocha Junior ⁱ , Maria Alzira Pimenta Dinis ^{d,e} ,
Johannes Luetz ^{f,g,h} , Gisleine Aver ^{i,*} , José Baltazar Salgueirinho de Andrade Guerra ^{i,j}

^a Manchester Metropolitan University, Department of Natural Sciences, Chester Street, Manchester, M1 5GD, UK

^b WSB Merito University, Wrocław, Poland

^c Hamburg University of Applied Sciences, Research and Transfer Centre “Sustainable Development and Climate Change Management”, Ulmenliet 20, D-21033, Hamburg, Germany

^d Fernando Pessoa Research, Innovation and Development Institute (FP-I3ID), University Fernando Pessoa (UFP), Praça 9 de Abril 349, 4249-004, Porto, Portugal

^e Marine and Environmental Sciences Centre (MARE), University of Coimbra, Edifício do Patronato, Rua da Matemática, 49, 3004-517, Coimbra, Portugal

^f Graduate Research School, Alphacrucis University College, Brisbane, QLD, 4102, Australia

^g School of Social Sciences, The University of New South Wales, Sydney, NSW, 2052, Australia

^h School of Law and Society, The University of the Sunshine Coast, Maroochydore, QLD, 4556, Australia

ⁱ Centre for Sustainable Development (Greens), University of Southern Santa Catarina (Unisul), Florianópolis, Santa Catarina, Brazil

^j Cambridge Centre for Environment, Energy and Natural Resource Governance (CEENRG), University of Cambridge, Cambridge, CB2 1TN, UK

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ABSTRACT

Prisons are inherently resource-intensive institutions, consuming substantial amounts of energy, water, and materials. The adoption of sustainable practices within these environments offers a significant potential to reduce carbon emissions, minimize waste, and conserve natural resources—thereby contributing to broader environmental goals. Initiatives such as energy-efficient lighting, renewable energy integration, and water conservation measures have demonstrated effectiveness in lowering operational costs and reducing the financial burden on taxpayers. Despite these clear advantages, research on environmental sustainability in correctional settings remains limited. In response to this gap, this paper explores the critical need for sustainability practices within prison systems, emphasizing the role of environmental stewardship in modern correctional management. By using an analysis of the literature and illustrative case studies, the study examines a range of initiatives designed to reduce waste, conserve energy, and support sustainable food production. The analysis highlights successful examples where eco-friendly practices have not only lowered operational costs but also enhanced rehabilitation outcomes for incarcerated individuals. Additionally, it provides an analysis of the challenges and opportunities associated with environmental sustainability in prisons and advocates the need for a comprehensive approach to correctional management that aligns ecological responsibility with prisoner education and community engagement. Ultimately, the findings suggest that adopting environmental sustainable practices can transform prisons into centers of positive change, benefiting both the environment, incarcerated persons, and society at large.

1. Introduction

There are more than 11.05 million people incarcerated throughout the world, with the most being in the United States - more than 2.2 million (Penal Reform International & Thailand Institute of Justice, 2024, p. 6; Walmsley, 2015). The top-5 largest prison populations in the world are as follows: the USA, China, Brazil, Russia and India.

Nevertheless, the top-5 largest prisons in the world are in different countries (but for one in the USA): the first is New Bilibid Prison in the Philippines, the second is Silivri Prison in Turkey, then Klong Prem Central Prison in Thailand, Los Angeles County Jail in the USA, and Tihar Jail in India (Arora, 2024). Notably, across many jurisdictions, indigenous populations are disproportionately represented in prison systems—an international trend exemplified by Australia, where First

* Corresponding author at: Centre for Sustainable Development (Greens), University of Southern Santa Catarina (Unisul), Florianópolis, Brazil.

E-mail addresses: walter.leal2@haw-hamburg.de (W. Leal Filho), jrufsc@gmail.com (V.R. Junior), madinis@ufp.edu.pt (M.A.P. Dinis), jluetzt@usc.edu.au (J. Luetz), gisa.aver@gmail.com (G. Aver), jose.baltazarguerra@animaeducacao.com.br (J.B.S.A. Guerra).

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Nations people comprise 36 % of the prison population despite making up only 3 % of the general population (ABS, 2025). The Australian Human Rights Commission (AHRC) has referred to indigenous prisoners as “the most incarcerated people in the world” (AHRC, 2021, para. 8). Significantly, for communities, whose cultural identities are deeply rooted in connection to land and Country, greener, more sustainable, and culturally responsive prison environments hold particular well-being and rehabilitative significance.

Prisons, like other institutions, consume significant amounts of energy and resources (Cross et al., 2017), producing considerable waste. They typically rely on outdated infrastructure (Imandeka et al., 2024), with high utility demands and inefficient waste management systems. Implementing sustainable practices can significantly mitigate these issues, fostering a greener approach to incarceration while also benefiting the surrounding communities. By adopting greener technologies and practices, correctional facilities can lower their ecological footprint (LeRoy et al., 2012), ultimately contributing to national and global sustainability goals. The integration of sustainability practices within prison systems is a relatively novel yet critical field of study, emphasizing the potential for environmental stewardship to contribute to both ecological and social outcomes. Prisons, often criticized for their substantial ecological footprints and outdated infrastructures, have the opportunity to transform into institutions that not only reduce environmental harm but also promote rehabilitation and community engagement.

The nature of sustainable practices among prison systems revolves around integrating environmentally responsible methods within correctional facility operations and prison programmes (Jewkes & Moran, 2015; LeRoy et al., 2012). Sustainability in prisons encompasses strategies aimed at reducing their environmental impacts, conserving resources, and promoting ecological awareness among prisoners and staff. As the global community increasingly recognises the urgency of addressing environmental issues such as climate change, waste management, and resource depletion, the need for sustainable practices within prison systems becomes increasingly critical (Glade et al., 2022; Prison Insider, 2024). The need for sustainable practices in prisons is driven by several factors (LeRoy et al., 2012). Firstly, the relationship between environmental degradation and socioeconomic issues, including crime, is increasingly recognized. Sustainable practices can serve as a proactive approach to addressing some of the underlying factors contributing to incarceration, such as poverty and lack of opportunity (Adams et al., 2020). Moreover, as society becomes more ecologically conscious, there is a growing expectation for institutions, including prisons, to contribute positively to environmental goals (Jewkes & Moran, 2015). Implementing sustainability practices enhances the image of the correctional system, demonstrating a commitment to social responsibility and rehabilitation. By providing incarcerated persons with opportunities to engage in sustainability efforts, prisons can contribute to their personal development, imparting valuable skills (Jauk-Ajamie et al., 2023), and fostering a sense of responsibility toward their community and environment (Nadkarni et al., 2022; Trivett et al., 2016).

This paper first reviews the literature on environmental sustainability in correctional facilities published over the past fifteen years, with the explicit aim of developing a theoretical framework for understanding key ideas and practices. This framework is then applied to a set of international case studies that illustrate how sustainability is being pursued in diverse prison contexts, enabling a comparison between scholarly insights and real-world implementation. Throughout this article, *prison* denotes adult custodial institutions holding convicted persons (the international default), whereas *jail* is used only where it signifies local, short-term custody for pre-trial detainees or sentences of approximately twelve months or less (primarily North American usage). We use *correctional facility* as an umbrella term encompassing prisons, jails, and remand centres; where sources employ other labels (e.g., penitentiary, detention centre), we retain the original terminology.

Because governance, populations, sentence length, and program availability differ across contexts and facility types, findings from one setting are not assumed to generalise wholesale to another. This paper uses *prison* for post-conviction contexts and *correctional facility* for cross-setting statements.

2. Understanding the theory and practice of green prisons

This paper employs a dual-pronged methodological approach to gather comprehensive insights into the sustainability initiatives implemented within correctional facilities. First, it undertakes an expert-driven literature review, highlighting gaps in knowledge, identifying best practices, and providing a comprehensive overview of environmental sustainability practices in carceral settings. Second, it presents in-depth case studies of selected correctional facilities that exemplify the implementation of innovative environmental initiatives. We briefly describe the aims and objectives of both approaches.

The first approach employed in this study is a literature review, through which research and publications from the past fifteen years on environmental sustainability practices in prisons were analysed. This included academic articles and reports addressing topics such as environmental quality, waste management, contact with nature, and energy and water efficiency. The review also examined innovative initiatives aimed at promoting sustainable development and reducing the environmental impacts of correctional facilities. This foundational step established a theoretical framework, identified best practices, and highlighted gaps in current knowledge. By reviewing a wide range of sources, the paper positions its findings within the broader context of sustainability and corrections. In the literature review stage, the selection of academic articles followed a systematic approach to ensure a comprehensive analysis of sustainability practices in prisons (Booth et al., 2016). The database used for this process was SCOPUS, which was chosen for its extensive repository of peer-reviewed publications. Given the relatively unexplored nature of the topic, broad search terms were employed to maximize the number of relevant articles retrieved. The Boolean operator “Sustainability” AND “Prison” was identified as the most effective search query, yielding a total of 143 articles. Following this initial retrieval, all titles and abstracts were carefully reviewed to identify studies that were most aligned with the research focus. This screening process resulted in a preliminary portfolio of 32 articles that directly addressed sustainability initiatives within correctional facilities. Following the systematic literature review, the authors also incorporated selected recent policy documents (grey literature) to capture key developments shaping sustainability in prison settings. Grey literature is particularly valuable in this context for illuminating real-time developments, policy innovations, and institutional responses that are often underrepresented—or slower to appear—in peer-reviewed academic sources, such as the case here. Including such material ensures a more comprehensive and timely account of sustainability efforts. Accordingly, key institutional reports and policy documents were identified through a targeted online document search, enabling the final dataset to integrate both scholarly and grey literature in support of a holistic understanding of sustainability in the prison context.

To provide real-world examples of successful sustainability initiatives, the paper deployed a second method, namely specific case studies of selected correctional facilities that have implemented innovative eco-friendly practices. These case studies include prisons that have adopted programmes such as organic gardening, energy-efficient technologies, and comprehensive recycling systems. Data gathered from these facilities include operational insights, program structures, and observed benefits (Stake, 1995; Yin, 2018). To ensure relevance and depth, the case studies were selected based on three key criteria: (i) demonstrable implementation of sustainability initiatives; (ii) availability of publicly accessible documentation or academic literature; and (iii) diversity of practices across environmental, educational, and infrastructural domains. We chose examples from the United States and Europe, where

sustainability initiatives in carceral contexts have been more extensively developed, documented, and evaluated. While earlier drafts included examples from other global regions, such as India, these were removed following internal review due to concerns over potential negative framing and limited alignment with the manuscript's constructive emphasis on replicable good practice.

Jointly, these two methodological approaches offer a comprehensive understanding of how sustainability practices are integrated within prison environments. By engaging both the peer-reviewed literature and concrete examples of best-practice models from the case studies, the analysis enables a nuanced assessment of the effectiveness of green corrections and their implications for incarcerated individuals and the broader community (Creswell & Creswell, 2018).

3. Research and theory of green prisons

Several studies underscore the critical relationship between environmental quality and the well-being of incarcerated individuals. Research examining greenspaces, air quality, and natural light reflects how healthier environments within and around prisons positively impact on physical and mental health (Alves et al., 2024; Block, 2023; Brown et al., 2019; Jenkins, 2016; Jewkes et al., 2020; Moran, 2019; Moran et al., 2024; Semple et al., 2019). A study on prisons in England and Wales revealed that higher levels of greenspace within a 500-m buffer zone were significantly correlated with reduced incidents of self-harm and violence among incarcerated persons. This relationship persisted even after accounting for variables such as prison size, type, and crowding levels, suggesting that incorporating greenspaces into prison planning can substantially improve both the well-being of incarcerated persons and operational outcomes (Moran et al., 2022a, 2022b).

Effective waste management is a cornerstone of sustainable practices in correctional facilities. Studies reveal that poor waste management exacerbates environmental and health issues for both prisoners and surrounding communities, for example, the Campania region in Italy illustrates the severe consequences of inadequate waste disposal. The proximity of Santa Maria Capua Vetere prison to landfills and waste sorting facilities results in air pollution, water contamination, and health risks for incarcerated persons and staff (Privitera et al., 2024). A long-term study analysed the proximity of prisons in Oklahoma to toxic pollution sources between 2011 and 2017, revealing that areas with prisons have higher levels of toxic substance release than areas without such facilities. The study also suggested the importance of thorough environmental evaluations when selecting sites for new prisons, the avoidance of regions with high concentrations of pollutants, and the need for continuous monitoring of air and water quality (Leon-Corwin et al., 2020). The location of prisons can contribute to environmental injustice, by highlighting the concentration of these facilities in already polluted areas, studies suggest the need for more sustainable and equitable practices in the planning and management of such infrastructures (Bradshaw, 2018; Opsal et al., 2023). In addition to addressing location and waste-related health hazards, prisons can adopt innovative practices to reduce their ecological footprint, like recycling programs and composting initiatives that allow facilities to manage waste responsibly while offering prisoners opportunities for vocational training and engagement. Some prisons in the United States have implemented prisoner-led recycling programs, contributing to both environmental conservation and skill development (Bohlinger, 2019). A study in Thailand considered an initiative toward a circular economy model, where the reuse of materials discarded by manufacturers and waste from construction sites near prisons are repurposed to improve facility infrastructure (Lawanyawatna & Schoch, 2024). Despite these advancements, many facilities still lack systematic approaches to waste management, highlighting a significant gap in the literature and practice.

Correctional facilities are often energy-intensive and rely on

outdated systems that contribute to high operational costs and environmental degradation, therefore a key component of sustainability in these facilities is improving energy efficiency. Prisons can reduce energy consumption by upgrading to energy-efficient lighting, utilizing renewable energy sources such as solar panels, and implementing smart-building technologies that monitor and optimize energy use (Alshafey et al., 2022; Imandeka et al., 2024). These measures not only lower utility costs but also create healthier environments for both incarcerated persons and staff. For instance, improved ventilation and natural lighting can significantly enhance the well-being of individuals living and working in these settings (Gjocaj, 2024). Moreover, many European countries are focusing on integrating sustainable practices into their prison systems, with an emphasis on energy efficiency and waste management (European Prison Observatory, 2019; Prison Insider, 2024). Prisons have begun implementing technologies designed to conserve both water and energy, reducing operational costs and environmental impacts, which alleviate the negative effects of overcrowding and aging infrastructure. Research underscores the importance of sustainable construction in mitigating environmental damage and calls for the transformation of existing structures to better cope with climate risks, such as extreme temperatures, poor air quality, and limited access to essential resources like potable water (Penal Reform International and Thailand Institute of Justice, 2024; Barron et al., 2024; Prison Insider, 2024). For example, case studies from Norway highlight how modular and standardized construction methods minimize material waste and optimize resource efficiency (Økland et al., 2018). Additionally, energy conservation measures, including the use of renewable energy solutions like solar panels and biomass systems, are being implemented to further reduce costs and environmental impact (Bohlinger, 2019; da Silva & Barbosa, 2023).

Water conservation is another critical area where prisons can implement sustainable practices (LeRoy et al., 2012). Many correctional facilities operate on centralized water systems that often go unmonitored for leaks and inefficiencies, by investing in water-saving technologies such as low-flush toilets, water-efficient irrigation systems, retrofitting and rainwater harvesting systems, prisons can significantly reduce their water consumption (João et al., 2022; Machado, 2013). This not only alleviates pressure on local water resources but also promotes a culture of conservation among incarcerated persons and staff, encouraging them to become more conscious of their water usage. Sustainable food production and sourcing represent another area of innovation in prison sustainability, programs involving community gardens and vegetable cultivation have gained traction as effective methods for reducing the carbon footprint of food supply chains while providing prisoners with educational and therapeutic opportunities. Research on the use of controlled environment agriculture (CEA) models utilizing technologies that optimize water and energy resources for food cultivation has shown that these systems promote food self-sufficiency, reduce operational costs, and minimize the ecological footprint of prisons while providing nutritional quality of produce better health outcomes for incarcerated persons (Vaughan et al., 2023). Similar initiatives involving ecological farming practices have reduced food waste (Orsini et al., 2024), whereas other initiatives involving horticulture have demonstrated additional therapeutic benefits, enhancing prisoners' mental health and well-being, by increasing empathy among participants, building a sense of coherence, reconnecting with nature (Farrier et al., 2019; Farrier & Baybutt, 2024) and also contributing to desistance from crime by enhancing personal transformation, mental health and wellness (DelSesto, 2022). When these activities are connected with local communities a highly significant correlation between these initiatives and the fact that participants feel more connected to their community has been identified (Hoffman, 2020).

Environmental education and training in sustainable practices also emerge as central elements in various initiatives. Educational projects like the Master Gardener Project in the United Kingdom and the Sustainability in Prisons Project Network in the United States provide

incarcerated persons with opportunities for rehabilitation and learning. The former prepares prisoners for reintegration into the labor market, combining environmental education with vocational training (Brown et al., 2019), and the latter offers incarcerated persons courses and training in sustainability science, engaging them in habitat restoration and species conservation (Kaye et al., 2015; Little, 2015). Moreover, environmental sustainability practices can have long-term economic benefits for prison systems, by investing in green technologies and practices, facilities can reduce operational costs (Trivett et al., 2017; Ulrich & Nadkarni, 2009), which can then be redirected toward rehabilitation programs that support prisoner reintegration post release.

Finally, environment-themed art in prisons can offer significant therapeutic and sustainability benefits—even in the absence of direct tactile or sensory contact with nature (Tucker & Luetz, 2025). Art practices that engage with natural elements such as land, water, and non-human kin are particularly meaningful for incarcerated individuals of indigenous heritage, for whom the prison environment can be deeply distressing. For these individuals, such creative practices serve as culturally resonant forms of self-expression and healing, enabling symbolic reconnection with land, nature, and community (Tucker & Luetz, 2025, pp. 77–80). Therefore, environment-focused art in prison can approximate many of the psychological and spiritual benefits of direct nature contact—supporting mental well-being, cultural identity, and ecological awareness—while also contributing to the broader vision of more humane, greener, and more rehabilitative prison environments (EuroPris, 2024; Moran et al., 2020; Moran et al., 2022a; Moran & Turner, 2019; NIC, 2011; Prison Insider, 2024; UNICRI-PRI, 2025).

While the potential benefits of sustainability practices in prisons are evident, critical perspectives highlight the limitations and challenges associated with their implementation. On the one hand, these practices are considered underused especially because of infrastructural limitations and funding constraints (Farrier & Baybutt, 2024). On the other hand, scholars caution against the risk of *greenwashing*, where sustainability initiatives are employed primarily to reduce costs or enhance institutional image rather than achieve meaningful environmental and social outcomes (Jewkes & Moran, 2015; White & Graham, 2015). Furthermore, some scholars argue that sustainability initiatives may obscure deeper systemic issues within the prison-industrial complex, like expansionist carceral agendas or mass incarceration, and depoliticize the violence of incarceration while reproducing systemic inequities (Alexander, 2024; Bohlinger, 2016; Hazelett, 2023; Moran & Jewkes, 2014). To truly integrate sustainability into prisons, these efforts must address broader systemic challenges, such as the cycles of incarceration that devastate marginalized communities and adopt a more rehabilitative approach rather than a retributive one. A more holistic approach - grounded in the interconnected dimensions of social, economic, and environmental sustainability - is necessary to address the root causes of unsustainability and to promote meaningful rehabilitation and community cohesion (Adams et al., 2020; Moran & Jewkes, 2014).

4. Practices and applications

4.1. Literature-derived insights

The findings from the literature review highlight that environmental sustainability practices in prisons offer multifaceted benefits, contributing to both environmental and rehabilitative outcomes. Studies have demonstrated that improved environmental quality, nature contact, increased greenspaces, better air quality, and natural lighting, are correlated with reduced self-harm and violence among prisoners, reinforcing the importance of ecological considerations in prison design (Alves et al., 2024; Jewkes et al., 2020; Moran et al., 2022a, 2022b; Moran & Turner, 2019). More specifically, there are strong indications in the research literature that nature contact is conducive to fostering and sustaining the well-being of both incarcerated persons and carceral staff (Moran et al., 2020; Moran et al., 2022a; Moran & Turner, 2019).

Waste management initiatives, such as recycling programs and circular economy models, have also been shown to mitigate environmental risk while fostering prisoner engagement and skill development (Bohlinger, 2019; Lawanyawatna & Schoch, 2024). Similarly, sustainable energy solutions, including modular construction and renewable energy integration, have demonstrated efficiency in reducing resource consumption and operational costs (da Silva & Barbosa, 2023; Økland et al., 2018). In the realm of food production, horticulture, and controlled environment agriculture (CEA) initiatives have provided incarcerated persons with nutritional benefits and therapeutic opportunities, enhancing mental well-being and increasing community connections (Farrier et al., 2019; Hoffman, 2020; Vaughan et al., 2023).

However, the literature also reveals critical tensions that complicate the implementation and meaning of environmental sustainability in prison contexts. Funding constraints, aging infrastructure, and administrative resistance hinder the scalability of sustainability programs (Farrier & Baybutt, 2024). Furthermore, critical perspectives caution against *greenwashing* practices that prioritize cost-saving and institutional branding over meaningful social and environmental transformation (Alexander, 2024; Hazelett, 2023; Jewkes & Moran, 2015; White & Graham, 2015). To fully integrate sustainability into correctional systems, these initiatives must be framed within a broader rehabilitative and social justice context, ensuring that sustainable policies align with decarceration strategies and community resilience (Adams et al., 2020; Moran & Jewkes, 2014).

The studies on environmental sustainability within correctional facilities analysed in the literature review can be consolidated into a theoretical framework, while acknowledging its internal contradictions. Rather than offering a normative model, the framework systematizes existing initiatives across five interrelated domains: (i) Education for Sustainability, (ii) Sustainable Infrastructure, (iii) Water Conservation, (iv) Energy Efficiency, and (v) Waste Management. Each of these themes is interconnected, with sub-themes that emerged either independently or in combination across various studies. **Education for Sustainability** includes sustainable training programs, workshops, hands-on practice projects, awareness initiatives and community engagement; **Sustainable Infrastructure** focuses on the use of eco-friendly building materials, improving thermal efficiency, maximizing natural lighting, and incorporating green spaces to enhance environmental quality; **Water Conservation** covers strategies such as water capture and reuse, reducing overall consumption, and improving water treatment and quality; **Energy Efficiency** addresses sustainable energy generation, reducing energy consumption, and implementing monitoring and optimization systems; Lastly, **Waste Management** includes recycling and reuse practices, minimizing waste generation, and adopting composting and organic waste management strategies. These initiatives promote environmental improvements in prisons, and can go further, producing positive effects on the well-being of incarcerated persons and staff, enhancing mental health and the overall quality of the prison environment. On the other hand, tensions and barriers emerge as important counterpoints, reminding us of the opposing forces that must be considered. As illustrated in Fig. 1, the framework invites reflection on how these practices might either reinforce or challenge existing penal structures. Thus, promoting sustainability in prisons requires not only technical solutions but also a broader alignment with systemic issues such as decarceration strategies and community resilience (Adams et al., 2020; Moran & Jewkes, 2014).

The following section presents specific case studies that illustrate how sustainability practices have been implemented in correctional facilities across different contexts. By examining specific initiatives, such as sustainable infrastructure projects, waste management strategies, and prisoner education programs, this section offers a comparative perspective on how sustainability can be integrated into prison management. The selected case studies serve as empirical evidence to support the broader discussion on sustainable corrections, showcasing innovative approaches, while identifying potential barriers and areas for



Fig. 1. Theoretical framework.
Source: The Authors, 2025.

improvement.

4.2. Case studies of sustainability in prisons

This section discusses selected case studies (Table 1) featuring

Table 1
Examples of sustainability integration in carceral context.

Case study examples	Supporting references
Sustainability in Prisons Project (SPP)	Nadkarni & Pacholke, 2013; Trivett et al., 2016; LeRoy et al., 2012; Sustainability in prisons Project, 2024.
European Sustainable Energy Award for Prisons (E-SeaP)	Christoforidis et al., 2014
Greener Prisons Initiative (UK)	Sustainable Food Trust, 2019, 2024

Source: The authors, 2025.

examples of sustainability practices in international settings (Table 2).

Table 2
Integrated sustainability practices in prisons.

Examples of sustainability practices	Supporting references
Environmental education programs	Trivett et al., 2017
Organic gardening and native plant cultivation	Nadkarni & Pacholke, 2013; Trivett et al., 2016; LeRoy et al., 2012
Recycling and composting	LeRoy et al., 2012; Trivett et al., 2016
Energy efficiency projects like ultra-low-flow toilets	Christoforidis et al., 2014; LeRoy et al., 2012
Food waste reduction and ecological farming	Orsini et al., 2024; Lawanyawatna & Schoch, 2024
Horticultural education and beekeeping	Sustainable Food Trust, 2019; Trivett et al., 2016

Source: The authors, 2025.

The featured examples were chosen based on their pertinence, degree of innovation, and potential for replication and implementation in other contexts. The analysis also revealed relevant challenges and barriers to effective and enduring change (Table 3).

The *Sustainable Prisons Project (SPP)* in Washington State addresses significant sustainability challenges by engaging incarcerated individuals, who are often underrepresented in scientific discussions and sustainability efforts. It also identifies and transcends considerable barriers, such as cultural resistance from both prison administrators and incarcerated persons, limited educational opportunities within the prison system, local environmental degradation, and a lack of meaningful rehabilitation activities (Trivett et al., 2016). Notably, security constraints often complicate the implementation of sustainability practices, while the structured environment of prisons may also facilitate focused efforts toward ecological restoration and sustainable operations. Set against this contextual background, the SPP has successfully demonstrated that substantial impacts can be achieved through collaborative efforts with various organisations, including zoos and conservation groups. Several sustainability actions have been implemented, which educate prisoners about sustainable practices and invite them to participate actively in conservation efforts. For instance, incarcerated persons have participated in recycling programs, grown prairie plants, built bird boxes, and even reared endangered species like the Oregon Spotted Frog, thus contributing to ecological restoration (Nadkarni & Pacholke, 2013). By participating in organic gardening and the cultivation of native plants, prisoners have supported local food production, biodiversity, and habitat restoration. Moreover, the SPP has demonstrated that sustainability may be practically implemented in correctional contexts (Trivett et al., 2016). For instance, water conservation efforts have seen the installation of rainwater catchment systems and ultra-low-flow toilets, which conserve potable water. Energy sustainability is addressed through an Energy Service Company (ESCO) initiative and the use of push-blade mowers that reduce fuel consumption. Resource management focuses on recycling and composting, with zero-waste garbage sorting and vermicomposting systems. In addition, the SPP incorporates vegetable gardening, conservation nurseries, and ecological research to promote resource efficiency. By engaging incarcerated persons in hands-on activities like growing native plants and vegetables, the initiative has advanced embodied forms of learning that are known to enhance environmental consciousness while simultaneously providing vocational training opportunities (Buxton et al., 2021). Taken together, the SPP aims to reduce the environmental prison footprint while engaging incarcerated persons in activities that promote sustainability and encourage program participants to rethink their relationship with nature and their roles in society through reflections on animal behaviour and discussions of environmental ethics (LeRoy et al., 2012). Significantly, the SPP has shown a capacity to improve prisoner well-being, reduce idleness and violence, and foster a sense of community contributions through food bank donations and ecological restoration. Acquired efforts and skills are recognized with certifications that

increase post-release employment opportunities. By combining hands-on sustainability experiences within a program of embodied education, the SPP project has raised awareness of science and sustainability and inspired new perspectives and future careers in these fields. Given these and other benefits, the SPP serves as a model for potential replication, showcasing how prison populations may be meaningfully engaged in sustainability practices (Nadkarni & Pacholke, 2013).

The *European Sustainable Energy Award for Prisons (E-SeaP)* project reveals the critical sustainability challenges faced by prison facilities across Europe, primarily due to aging infrastructure, elevated energy consumption, and a prevailing focus on security-centric management priorities (Christoforidis et al., 2014). These systemic issues are compounded by several interconnected barriers, including limited financial resources, centralized budget control mechanisms, low levels of awareness among prison staff, and inadequate energy management systems. E-SeaP responded to these challenges with a holistic and integrated framework designed to build capacity and improve sustainability performance within carceral institutions. This framework is structured around three interconnected strategic approaches. First, it emphasized management improvements, which involved the development of institutional energy policies and the implementation of monitoring systems to enable data-driven decision-making and accountability in energy use. Second, it introduced education and training initiatives targeting both staff and prisoners. These mandatory sustainability courses aimed to enhance awareness, foster behavioural change, and build a shared culture of environmental responsibility within prison environments. Third, E-SeaP pursued community engagement strategies, such as offering energy-saving advice and supporting vocational skills development that would assist incarcerated persons with reintegration upon release. Addressing energy challenges through a multifaceted strategy, the E-SeaP project underscored that meaningful sustainability in prisons cannot be achieved through technical upgrades alone. Rather, it requires a transformation of institutional practices, cultures, and behaviors. The project's contribution lies in demonstrating how sustainability goals can be embedded within the operational and educational fabric of carceral systems, thereby promoting long-term systemic improvements that align environmental responsibility with social rehabilitation.

In the UK, the *Greener Prisons Initiative (GPI)* at Her Majesty's Prison (HMP) Bristol represents a forward-thinking collaboration between the Sustainable Food Trust and the correctional system, aiming to embed sustainability principles into the everyday life of carceral institutions (Sustainable Food Trust, 2019, 2024). Established in 2019, the initiative seeks to enhance ecological literacy, reduce food waste, and reconnect incarcerated individuals with the natural world through a range of hands-on, rehabilitative activities (Sustainable Food Trust, 2019). At the heart of the programme is a structured series of horticultural and educational interventions that allow prisoners to actively engage in vegetable cultivation, composting, and food preparation using garden produce. These activities are supported by cookery classes and workshops that focus on sustainability, nutrition, and the environmental impacts of food systems (Moran & Turner, 2019). These educational elements are not only intended to promote healthier behaviors during incarceration but also aim to equip prisoners with meaningful, transferable skills that support rehabilitation and post-release employability. In addition to plant-based activities, the GPI includes animal husbandry and beekeeping, further encouraging prisoners to form constructive relationships with their environment (Sustainable Food Trust, 2024). The physical design of internal prison spaces has also been reconsidered: the inclusion of indoor plants and an emphasis on natural light are intended to improve the institutional atmosphere and contribute to a calmer, more restorative setting (Sustainable Food Trust, 2019). Evaluative reports suggest that the initiative has led to measurable improvements in prisoner well-being, a reduction in behavioural incidents, and greater staff engagement with sustainability efforts (Moran & Turner, 2019; Sustainable Food Trust, 2019). Additionally, the development of greener outdoor spaces, planted with pollinator-friendly

Table 3
Challenges and barriers to sustainable prisons.

Challenges and barriers	Supporting references
Cultural resistance from incarcerated persons and administrators	Nadkarni & Pacholke, 2013; Trivett et al., 2016
Mass incarceration, overcrowding, inadequate infrastructure, and reliance on prison labour	Bohlinger, 2016
High initial costs and limited funding	Christoforidis et al., 2014
Focus on economic over environmental goals	Jewkes & Moran, 2015; Moran & Jewkes, 2014
“Green Prison” discourse deflects attention from mass incarceration issues	Moran & Jewkes, 2014
Disregard for indigenous values undermines culturally responsive and sustainable corrections	Blagg & Anthony, 2019; Chartrand, 2019

Source: The authors, 2025.

native species, fosters a stronger emotional and psychological connection between participants and the natural environment (Sustainable Food Trust, 2024). The programme is also designed with long-term rehabilitation in mind, offering accredited training in areas such as sustainable land management and horticulture—skills that are directly applicable to environmentally focused sectors outside prison walls (Sustainable Food Trust, 2019, 2024).

Moving beyond the case examples discussed in the Literature Review, several other studies highlight innovative practices—ranging from retrofitting prison infrastructure to building community partnerships—that illustrate how diverse approaches can align correctional systems with environmental sustainability. For instance, Orsini et al. (2024) discuss collaborations in prisons that implement ecological farming practices and reduce food waste. Machado (2013) focuses on retrofitting prisons to enhance waste reduction and on-site wastewater management. Lawanyawatna and Schoch (2024) highlight waste reduction practices and the reuse of materials to enhance sustainability in correctional facilities in Thailand. Trivett et al. (2017) discuss food waste disposal reduction and sustainability programs that involve prisoners in environmental education. Notably, the authors highlight that environmental education programs have enhanced the quality of life within prisons and inspired environmental activism among individuals outside traditional environmental circles. Other framework approaches include the Strategic Sustainability Performance Plan (SSPP) developed by the US Department of Justice to improve energy efficiency, the Greening of Corrections report providing guidance on sustainable practices, and the implementation of green-collar training programs for prisoners aimed at enhancing employability and reducing recidivism (Feldbaum et al., 2011).

4.3. Challenges: insights and implications

Despite the discussed advances, more progress is needed in terms of sustainability practices in prisons. Overall, sustainability practices in prisons tend to be limited in scope and effectiveness, reflecting a tension between operational efficiency and enduring environmental transformation. Several studies have identified key barriers to change, both in areas of practical challenges and systemic issues. For instance, Bohlinger (2016) has noted key limiting factors, including the underlying issues of mass incarceration, recidivism, and the over-reliance on prison labour for environmental projects, which can obscure the broader need for systemic reform. The research critiques the tendency to frame green initiatives as apparent solutions to the systemic flaws inherent in the penal system, arguing that sustainability programs often deflect attention from the urgent need for decarceration and meaningful rehabilitation.

Although composting, energy conservation, and local food production (such as prison gardens) are implemented, such sustainability efforts are typically motivated by economic or security concerns rather than genuine care for social or environmental sustainability. Bohlinger (2016) calls for a shift away from merely ‘greening’ prisons to questioning the logic of punitive systems themselves, urging a more holistic approach that engages the root causes of mass incarceration, such as poverty and inequality, while also ensuring that green practices do not replace essential mental health and educational services.

Similarly, studies by Moran and Jewkes (2014) and Jewkes and Moran (2015) highlight the sustainability challenges and barriers faced by the US prison system. Key challenges include the existing operational rationale that prioritizes the correctional economy over genuine sustainability, a narrow discourse that limits the scope of sustainable practices, and rising resource costs that frustrate widespread implementation. Other pertinent barriers include institutional resistance to change, a focus on regulatory compliance rather than meaningful environmental stewardship, and an emphasis on greening physical infrastructure at the expense of comprehensive programming.

Finally, the literature identifies ‘food’ as an important dimension

that hinders sustainable change. Food is central to physical, mental, and emotional well-being and holds deep cultural, social, and personal significance. Mealtimes serve as critical social and temporal anchors, offering structure for daily life and opportunities for interaction amidst the monotony of incarceration. However, prisons are characterised by a highly regulated food environment that deprives incarcerated persons of autonomy over their dietary choices, portion sizes, and meal schedules. This lack of control undermines prisoners’ health, self-esteem, and identity, heightening frustration and anxiety (Her Majesty’s Inspectorate of Prisons, 2016). The World Health Organization (WHO) has emphasized that understanding and managing food systems in correctional settings is crucial (Smoyer & Kjør Minke, 2015). Improved food practices can enhance prisoner health, bolster a sense of dignity, and support correctional administrators in fostering safer, healthier prison environments (Smoyer, 2019). By reforming food systems to be more wholesome, prisons can contribute to the well-being of incarcerated persons and carceral staff as a key conduit for fostering holistic sustainability in prisons.

A final systemic barrier to greener corrections warrants attention. Although indigenous populations are overrepresented in prisons globally—a trend starkly illustrated in Australia, where First Nations peoples constitute 36 % of the prison population but only 3 % of the general population (ABS, 2025)—their cultural identities are often marginalized or subsumed within dominant carceral paradigms (Blagg & Anthony, 2019; Chartrand, 2019). Most correctional systems are structured around mainstream cultural norms, with limited institutional accommodation for indigenous worldviews, kinship networks, or spiritual practices (Day et al., 2022; Shepherd et al., 2017). This systemic inattention to the values and worldviews of indigenous incarcerated persons contributes to cultural disconnection and psychological harm (Baldry et al., 2015; Chartrand, 2019), perpetuating what Nichols (2017) calls the “colonialism of incarceration”. The persistent disregard for indigenous knowledge systems in carceral settings (Blagg & Anthony, 2019) undermines opportunities to create more humane, inclusive, and sustainable rehabilitative environments (EuroPris, 2024; Moran & Turner, 2019; NIC, 2011; Prison Insider, 2024; Shepherd et al., 2017; UNICRI-PRI, 2025). Given the documented affinities between indigenous cosmologies and ecological sustainability (Luetz, 2024), dominant correctional models currently fail to harness culturally grounded pathways that could sustain greener, more equitable, and ethically responsive corrections. This is a missed opportunity for greener corrections (Moran & Turner, 2019).

While the mentioned case studies highlight successful examples of sustainability implementation, it is critical to acknowledge the structural, institutional, and cultural barriers that constrain broader transformation. These challenges are not isolated to specific facilities but reflect systemic tensions between punitive incarceration models and ecological responsibility. The conceptual Fig. 2 below synthesises these interlinked barriers, offering a framework for additionally understanding the limitations faced by even the most innovative green prison initiatives. This conceptual diagram maps out the interconnected structural, institutional, and cultural barriers that inhibit the implementation of sustainability in prisons. These include resistance from within the system, infrastructural shortcomings, environmental injustices, and the risk of superficial or tokenistic green initiatives.

5. Conclusions

With the global prison population surpassing 11 million and correctional facilities consuming vast resources, sustainability in prisons emerges as a critical yet underexplored field. This paper examines sustainability initiatives within prisons, highlighting their potential to improve environmental stewardship while fostering prisoner rehabilitation. Through a literature review of studies spanning the last fifteen years and an analysis of case studies, this paper establishes a comprehensive theoretical framework that categorizes sustainability efforts into



Fig. 2. Obstacles to sustainable prisons: a systems-level perspective.

Source: The Authors, 2025.

five key areas: Education for Sustainability, Sustainable Infrastructure, Water Conservation, Energy Efficiency, and Waste Management. By mapping the intersection of these dimensions, this study provides a structured foundation for assessing and implementing sustainability initiatives in correctional environments.

This study combined two complementary methodological strategies: a systematic literature review to ensure a comprehensive analysis of sustainability practices in prisons, and specific case studies of selected correctional facilities that have implemented innovative eco-friendly initiatives, such as the Sustainability in Prisons Project (SPP) in the United States and the European Sustainable Energy Award for Prisons (E-SeaP). These case studies reveal that integrating sustainable practices into prison management can generate multiple benefits, including reducing operational costs, improving prisoner well-being, and enhancing environmental responsibility. The findings suggest that initiatives like green infrastructure, prisoner-led recycling programs, horticultural education, and controlled-environment agriculture can transform prison environments, mitigating the negative effects of incarceration while preparing prisoners for reintegration into society. However, the study also underscores the challenges that hinder sustainability efforts, including financial constraints, infrastructural limitations, institutional resistance, and the risk of *greenwashing*, where sustainability programs are implemented primarily for cost-cutting or institutional branding rather than genuine ecological and social transformation.

Beyond examining best practices, this paper critically engages with the broader systemic implications of sustainability in prisons. While sustainable corrections can reduce environmental harm and improve prison conditions, some scholars argue that these initiatives can inadvertently legitimize incarceration rather than addressing its root causes. The findings highlight the need for sustainability to be framed within a decarcerative and rehabilitative approach rather than one that merely

improves prison conditions without questioning the larger structures of mass incarceration. Additionally, although case studies demonstrate the potential for sustainability initiatives, gaps remain in empirical evaluations of their long-term effectiveness, scalability, and adaptability across different sociopolitical contexts.

Future research should focus on measuring the long-term impact of sustainability initiatives in prisons, exploring how these practices can contribute to broader decarceration efforts, and ensuring equitable access to sustainability programs across different prison systems. Moreover, interdisciplinary collaboration between environmental scientists, criminologists, policymakers, and correctional administrators is essential to developing policies that balance ecological responsibility with social justice. Ultimately, this study emphasizes that integrating sustainability into correctional systems presents both opportunities and challenges. While it offers a pathway toward more humane and environmentally responsible prisons, it must be anchored within a broader agenda that prioritizes prisoner rehabilitation, community reintegration, and systemic prison reform. Only by addressing these interconnected dimensions can sustainability in prisons move beyond infrastructure improvements toward fostering a justice system that is truly restorative, equitable, and sustainable.

CRediT authorship contribution statement

Walter Leal Filho: Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Conceptualization. **Valdemiro Rocha Junior:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Maria Alzira Pimenta Dinis:** Writing – review & editing, Writing – original draft. **Johannes Luetz:** Writing – review & editing, Writing – original draft. **Gisleine Aver:** Writing – review & editing, Writing – original draft. **José Baltazar Salgueirinho de Andrade Guerra:** Writing – review & editing, Writing

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The authors report there are no competing interests to declare.

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Data availability

No data was used for the research described in the article.

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