Research article, Type: Subscription *Volume: 11*

Sustainable drainage systems for urban stormwater management

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Research article Page: 01-22

Sustainable drainage systems (SuDS) manage urban stormwater by mimicking natural hydrological processes through source control, infiltration, attenuation, and treatment, reducing flood risk and pollution. Key components include permeable pavements, swales, rain gardens, and detention basins that capture 70-90% of annual rainfall volumes locally, preventing sewer overloads. These systems improve water quality via sedimentation, filtration, and biological uptake, while green roofs and wetlands enhance biodiversity and urban cooling. Modular designs scale from streetscapes to city-wide networks, cutting infrastructure costs by 20-50% over traditional pipes. Implementation supports resilient cities through the "management train" approach, integrating source-to-regional controls.

Life cycle assessment of bamboo as a sustainable material

Emerson D. Peteros & Raymond C. Espina

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Life cycle assessment of bamboo as a sustainable material reveals significantly lower global warming potential (GWP) compared to steel, concrete, or tropical hardwoods, often achieving carbon negativity through rapid sequestration during its 3-5 year growth cycle. Cradle-to-gate analyses show bamboo products emit 3-20% less energy and CO2 during processing when waste biomass fuels production, with engineered variants like laminated lumber storing carbon long-term. End-of-life recyclability and biodegradability further reduce impacts versus non-renewable alternatives, though electricity-intensive processing remains a hotspot for optimization. Bamboo outperforms in water use and land efficiency, supporting circular construction aligned with your sustainable materials research.

Optimization of passive solar design in residential buildings

Rahimi Harsini

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Optimization of passive solar design in residential buildings focuses on south-facing orientation, strategic window-to-wall ratios (20-30%), and overhangs sized for latitude to maximize winter solar gain while blocking summer sun. Thermal mass walls like concrete or masonry absorb daytime heat for nighttime release, reducing heating demands by 30-50% in temperate climates. Direct gain systems prioritize living areas for sunlight collection, complemented by indirect strategies like Trombe walls for controlled heat distribution. Sunspace designs create buffer zones that preheat ventilation air, while proper insulation minimizes losses through high R-value roofs and slabs. These techniques, validated through energy simulations like BEopt, align with sustainable practices for urban residences in regions like

Comparative analysis of green roofing systems

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Green roofing systems primarily consist of extensive, semi-intensive, and intensive variants, each differing in substrate depth, maintenance needs, and load capacity. Extensive systems use shallow soil (2-6 inches) for low-maintenance sedum and grasses, ideal for retrofits with minimal structural reinforcement. Semi-intensive roofs offer deeper substrates (6-12 inches) supporting grasses and small shrubs, balancing accessibility and biodiversity. Extensive roofs suit urban high-rises for stormwater management (30-50% reduction), while intensive systems enhance recreation in commercial buildings. Modular variants enable easy installation on complex structures, integrating with solar panels for hybrid energy benefits. All types improve insulation, aligning with your sustainable design interests…… [For more click here].

Water conservation techniques in green building design

V. Eswar Manideep

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Water conservation techniques in green building design integrate low-flow fixtures like dual-flush toilets and aerated faucets to cut indoor usage by 30-50%, alongside rainwater harvesting systems that capture rooftop runoff for non-potable needs such as irrigation and flushing. Greywater recycling treats lightly used water from sinks and showers for reuse, reducing freshwater demand by an additional 20-40% through simple filtration and disinfection processes. Smart irrigation with soil sensors and weather-based controllers optimizes landscape watering, favoring drought-resistant native plants to minimize evaporation losses. Green roofs and permeable pavements enhance infiltration, mitigating urban runoff while cooling buildings naturally. These strategies align with sustainable practices, supporting eco-friendly materials and circular economy goals in your research focus…… [For more click here].