'Note: Page numbers followed by "f" indicate figures and "t" indicate tables.'

A	urban infrastructure and VC, 189
ABM. See Agent Based Model (ABM)	urban pollutant emission flux and fate in cities,
Above-ground plant respiration, 306	186—187
Accessibility to food, 137	Air quality index (AQI), 185–186
Accuracy assessment, 56–57	Air quality mitigation and adaptation strategies,
of classification, 40–41	329-330
AD. See Anaerobic digestion (AD)	Albedo, 50–51
Adequate shelter, 50	Alkylphenol ethoxylates (APEO), 252-253
Adolescents self-reported stress, 119	All Indian Institute of medical Sciences (AIIMS),
Aerobic composting/vermicomposting, 272	77–78
Aevena barabarta, 227	Aluminium, 307
Agent Based Model (ABM), 51–52	AMAP. See Associations pour le maintien d'une
Agrarian crisis, 79–81	agriculture paysanne (AMAP)
Agricultural	Ambient air
produce, 138-140	pollution, 187–188
societies, 18–19	quality, 13
wastes, 248	Ambient atmospheric temperature, 188
Agronomic response of waste stream	Amenities, 121
municipal solid waste compost/vermicompost,	Anaerobic digestion (AD), 255, 269, 271, 460-461
279-280, 281t-282t	Anglo-American scholarly research, 124
and sewage sludge, 283t-286t	Annual-averaged aerosol concentration, 192
wastewater, 280-288	Anthropogenic
AIIMS. See All Indian Institute of medical Sciences	aerosols, 196
(AIIMS)	air pollution, 325–326
Air pollution, 188, 322–323, 490–491	processes, 20–21
anthropogenic, 325–326	systems, 17–18
and health effects, 323-324	APEO. See Alkylphenol ethoxylates (APEO)
long-term effects, 324	AQI. See Air quality index (AQI)
short-term effects, 323	Artificial Neural Network, 39
and human health nexus in era of climate change,	Assessment simulation tool RETScreen software, 158
326, 328t	Associations pour le maintien d'une agriculture paysanne
pathway of air pollution effect, 324-325	(AMAP), 134
sources, 323	Atmospheric pollutants removal, 189
Air purification, 98	Australia, 112
Air quality and impact on urban environment	population and area, 113t
air pollution and urban vegetation, 188	population increase in percentage, 113t
atmospheric pollutants removal, 189	Australian research on environmental justice,
case study of urban air quality of Delhi, 190-198	121-122
and human health, 187–188	Automated trends analysis, 211
temperature and urban microclimate, 188	Automation of waste management, 469-471

В	Carbon, 5, 18, 24–25
Bal Bharti Vidyalaya Junior High School building	dynamics, 102–103
and 3D simulation model, 147, 147f	emissions, 491–492
	metabolism, 101–103
Bangalore, 52–53, 53t, 60t, 64t	reduction, 160
Barcodes, 469–470 BC Sas Black carbon (BC)	Carbon dioxide (CO_2), 186, 302
BC. See Black carbon (BC)	CO ₂ -equivalent emissions, 25–26
BDcyclists, 166–167	emissions, 146
BFM. See Brute force method (BFM)	
Bibliometric analysis, 481	Carbon monoxide (CO), 186, 465–466
Bicycle	Carbon reduction strategies
mode, 176	carbon reduction, 160
tourism, 178–179	case studies, 146–158
Bicyclists, 169–171	college (secondary education), 154–155
'BIKEline' school campaigns, 176–177	public auditorium, 156–158
Biodegradable waste, 460–461	school (primary education), 147–148
Biodiversity, 94–95, 482–484	temple complex, 148–153
Biogenic volatile organic compounds (BVOCs),	economic feasibility, 160
318-319, 325-326	energy savings, 159
Biogeochemical cycles, 23–25	Carrying capacity, 93
Biogeochemistry fluxes, 22–23	CATL. See Ceinture Alimentaire de Liège (CATL)
Biological N recovery, 269	CBAs. See Critical Biodiversity Areas (CBAs)
Biological Network (BioNet), 224–225, 232–233	CBS. See Croatian Bureau of Statistics (CBS)
Biomedical/hospital waste, 248	CDW. See Construction and demolition wastes
Biosolids, 277–278, 288–289	(CDW)
Black carbon (BC), 190	Ceinture Alimentaire de Liège (CATL), 139–140
extinction coefficient, 192-193, 192f-193f	Cellular Automata (CA), 51–52
Bromus diandrus, 227	Ceramics wastes, 244
Bromus hordeaceus, 227	CESAs. See Critical Ecological Support Areas
Brundtland Commission, 436	(CESAs)
Brute force method (BFM), 51-52, 59, 62-64, 64f	CFR. See Cape Floristic Region (CFR)
Building type	China's typical informal settlements, 381–383
results, 148, 149t, 153, 155, 158	Chlorophyll synthesis, 102–103
site details, 147-158, 150t	Cities, growth and development of, 6
climatic conditions, 147	Cities management
Building-related GHGs emission, 146	acronyms/publication year/developer, 342-344
Built environment, 150	approach to assessing SD at local level, 348-350,
Burial/landfilling, 255	349f
of MSW, 255	economic dimension, 346-347
Buyukcekmece (water basins of Istanbul), 208	environmental dimension, 346
BVOCs. See Biogenic volatile organic compounds	formulating indicators assessment based on
(BVOCs)	sustainable development dimensions,
Byzantine Constantinople, 205	344-346
Ţ,	indicators to monitoring sustainable development,
C	340-342, 342f
CA. See Cellular Automata (CA); Correspondence	institutional dimension, 348
analysis (CA)	social dimension, 347–348
CA-based open-source land-use change simulation	sustainability management in cities, 337-340
model, 51–52	City Blueprint Approach, 209–210
CAG. See Comptroller and Auditor General (CAG)	City municipal boundary, 55
Calibration phase, 59	Classic Maya civilization, 205
Cape Floristic Region (CFR), 223	Climate, 202
Cape Town, 223	climate-induced migrants, 73–74
Cape Town, 223 Cape Town BioNet, 224, 233	climatic conditions, 147
Cupe TOWIT DIOINCL, 227, 200	,

Climate change, 7, 137, 300–301, 306–308, 485–486,	Date envelopment analysis, 102
493-494	Decision Support Systems, 20-21
air pollution and human health nexus in, 326	Delhi, urban air quality of, 190-198
climate change induced displacements, 73-74, 74t	Demographic considerations, 123
Cocioeconomic activities, 12–13	Detection and imaging technologies, 469-470
Collaboration, 124	Development-induced displacement, 72
College (secondary education), 154-155, 154f	Dhaka, 164–173, 167f, 170f, 172f
Color system of waste bins and containers, 464	Dhaka-based Facebook cyclist group, 166–167
Commercial urban certifications, 369–370	transport system, 177
Community gardens, 112	DIDs. See Disaster Induced Displacements (DIDs)
Comprehensive resource-management strategies,	Diet, 136
25–26	Disaster
Comptroller and Auditor General (CAG), 83	and climate change induced displacements, 73-74,
Conflict-induced displacement, 72	74t
Confusion matrix, 40–41	disaster-induced and rural-to-urban migration, 12
Construction and demolition wastes (CDW), 246	disaster-linked displacements, 72
Consumers, 138–140	and displacement in India, 74–76
Containers, 471	induced displacements, 85
Contamination risks, 18	risk reduction, 12
Contemporary machine learning—based methods, 39	Disaster induced displacements (DIDs), 72, 87f,
	493–494
Conventional ecology 100	
Conventional ecology, 100	Disturbances, 222
Conventional economics, 100	Diversity, 378–379
Conversion of DN into radiance, 58	DN conversion into radiance, 58
Copenhaganize Index, 164–165	Double-storey restroom block, 151–152
Correspondence analysis (CA), 481	Drinking water, 85–86
Country-wise division of urban ecology research	Dual Arrhenius Michaelis Menten model (DAMM
(2009–2019), 7–8	model), 303–304
Criteria pollutant, 197t	Dust column density, 194–195
Critical assessment, 447	T
Critical Biodiversity Areas (CBAs), 224	E
Critical Ecological Support Areas (CESAs), 224	E-bike sharing system, 176
Critical value, 363–364	e-Crafter, 468–469
Criticisms, 19	e-scooter, 164
Croatian Bureau of Statistics (CBS), 43	E-waste. See Waste electrical and electronic
Crowd mapping route data, 177	equipment (WEEE)
Crowd-source-based digital innovations, 164	Earth air tunnel system (EAT system), 146
Cucurbita maxima. See Squash (Cucurbita maxima)	Earth-sun distance correction, 37–38
Cycling	EAT system. See Earth air tunnel system (EAT
barriers in, 168–173, 169f–170f	system)
capital of Austria, 173–176	EBPR. See Enhanced biological phosphorus removal
competition, 176–177	(EBPR)
cycling-friendly urban road infrastructure, 164–165	Ecological deficit, 101
education level with bicycle availability in Tyrol	Ecological economics, 92–94, 99–100
Mobility Survey, 172f	of urban settlement
~	ecosystem services and valuation in urban
D	settlement, 96–104
DAMM model. See Dual Arrhenius Michaelis Menten	urbanization, 94–96
model (DAMM model)	Ecological/ecology, 4, 482–484. See also Urban
Data	ecological systems
acquisition, 55, 55t	of cities, 484, 486–493
technologies, 469-470	of city approach, 23
transmission technologies, 469-470	ecosystem, 4

Ecological/ecology (Continued)	modelling, 158
footprint, 101, 356	Energy flow accounting (EFA), 18-19
network analysis, 490-491	Enhanced biological phosphorus removal (EBPR),
sciences, 21–23	269-270
systems, 92	Entropy, 93
of urban villages, 401–404	Environmental
Economic	displacement, 73
accounting, 93	diversity, 393–397
consumption, 22–23	economics, 100
development, 92–93	emergency migration, 73
feasibility, 160	forced migration, 73
growth, 92–93, 458	induced displacement, 72
Economies of scale, 12–13	laws, 14
Economy-wide material flow accounting (EW-MFA),	motivated migration, 73
18	Environmental Impact Assessments (EIA), 360
Ecosystem, 22	
	Environmental justice
ecology, 4	mobilization in USA, 122
ecosystem-generated functions, 98	social inequity in access to greenspace as
services, 72	environmental justice issue, 121
frameworks, 18	eQuest software, 146–147
and valuation in urban settlement, 96–104	Essential micronutrients, 277
urbanization, 96	Eudrilus eugeniae, 272
Ecosystem disservices (EDSs), 94, 98	Europe, urban sustainability in, 359–361
Education, 14, 50	EW-MFA. See Economy-wide material flow
EEE. See Electrical and electronic equipment (EEE)	accounting (EW-MFA)
EFA. See Energy flow accounting (EFA)	Ex situ resource mobilization, 4–5
EIA. See Environmental Impact Assessments (EIA)	Exchange value, 103–104
Eisenia fetida, 272	Exclusion, 51–52
Electric	Exhaust
bicycle hire system, 176–177	emissions, 464–465
vehicles, 464–469, 467f	emissions, 465–466
VW e-Crafter, 468-469	gases, 250
Electrical and electronic equipment (EEE), 471-472	E
Electrical energy, 146	F
Electricity consumption, 155	Facebook cyclists group, 177
Electromagnetic spectrum, 57	FADQ. See Financière Agricole du Québec e the
Emergy, 18–19	Financial Agricultural Corporation of Québec
emergy-based analysis, 18-19	(FADQ)
emergy-related metabolism, 101-102	FADQ agricultural insurance programme, 137–138
Emissivity, 50-51, 57	False Color Composite (FCC), 56
Employed principal component analysis, 102	Farm Buildings in Senneville, 134–135, 136f
End-users, UM, 20–21	Farmland and Greenhouse in Senneville, 134–135,
Energy, 4, 50	136f
conservation, 450	FCC. See False Color Composite (FCC)
conversion processes, 18–19	Feedback effect, 208
crisis, 93	Fertilizer value of waste
demand, 258	biosolids, 277–278
flow, 5	municipal solid waste compost/vermicompost,
metabolism, 18–19, 101–102	273-274
performance of urban ecosystems, 490–491	wastewater, 274–276
recovery, 461	Finance, 4
savings, 159	Financière Agricole du Québec e the Financial
simulation, 153	Agricultural Corporation of Québec (FADQ), 137–138

urban population of India, 442–443 elements in building bylaws, 449–450 model building Byelaws 2004 and 2016, 449–450
opportunities for green building elements, 450
green building certification status in India,
444
green building effort and urbanization, 447
GRIHA, 439–440, 445
LEED India, 439
methodology, 438–439
regulatory framework of country, 446
status of amendment byelaws by states/UTs after
MBBL, 450–452
Green cover, 327–328
Green infrastructure, 205–206
capacity, 208
Green roofs and walls, 112
Green solutions, 205
Greenhouse gases (GHSs), 50–51
emission, 8, 133, 299–300
Greenness, 121
Greenspace, 112, 118–119
GRIHA, 439–440, 445
certification, 438–439
Gross Domestic Product (GDP), 50
Gross domestic product purchasing power parity
(GDP-PPP), 458
Gross state domestic product (GSDP), 83
Ground Control Points (GCPs), 55
Ground-level ozone, 186
Growth in population in Sydney, 112
GSDP. See Gross state domestic product (GSDP)
**
Н
Habitat condition, 231–232
Hampering biodiversity, 92
HANPP. See Human Appropriation of Net Primary
Production (HANPP)
Harmony of infrastructural and social practices, 179
Hazardous hospital waste, 246
Hazardous wastes, 245–246
HDI. See Human development index (HDI)
Health, 4, 50
and hygiene, 85–86
urbanization health challenge as, 117-118
Healthcare and infrastructure, 77–78
Healthy food, 141–142
Healthy foodstuff, 132
Heat-and-power systems, 25–26
Heating, ventilation and air conditioning (HVAC), 156
Heterogeneous polygons, 56
Hierarchical multiscale landscape models, 492–493
High-quality road maintenance, 175

High-resolution satellite imagery, 36, 38	urbanization in, 320–321
High-temperature burning, 187	Indian Green Building Council (IGBC), 439
Highly technological solutions, 204-205	Indian Institute of Science (IISc), 62
Hillshade, 51–52	Indicators of urban sustainability, 362-364, 369
HPS. See Hybrid power system (HPS)	threshold, critical value, target value and relative
Hubei village neighbourhood investigation	performance, 363–364
continuous history and diverse morphological	Indices, 363, 369
patterns, 385	Indo-Gangetic plain (IGP), 190
environmental diversity, 393–397	Indoor air pollution, 318–319, 323
morphological characteristics of investigated spaces,	Industrial ecology, 17–18, 23
386-390	Industrial emission, 187
neighbourhood dynamics, 390-393	Industrial Infrastructure Development Corporation
Human Appropriation of Net Primary Production	(IDCO), 82
(HANPP), 18–19	Industrial residue effect, 251
Human development index (HDI), 81	Industrial Revolution, 185-186, 318
Human health, 13-14, 187-188	Industrial waste, 250
nexus in era of climate change, 326	Information technologies in waste collection, 469-471
Human values, 140–141, 140t	Information technology sector (IT sector), 52–53
Human-dominated processes, 22-23	Innovative approaches, 123–124
Human-subsidized biogeochemical flows, 23-24	Innsbruck, 164–165
Human-ecosystem interaction, 486	transition in, 173–176
Hunter-gatherer, 18–19	key drivers in last decades, 174-176
HVAC. See Heating, ventilation and air conditioning	Innsbrucker Verkehrsverbund (IVB), 175
(HVAC)	Input-output model (IO model), 103
Hybrid methods, 39	Instrumental value, 99
Hybrid power system (HPS), 151, 151f	Insurance value, 100
Hygiene, 77	Integrated approach, 14
	Integrative science, 20
I	Intelligent Foresight analytics (iFORA), 210–211
IAPs. See Invasive alien plants (IAPs)	Interannual variability of anthropogenic and natural
IBM. See International Business Machines (IBM)	aerosols over Delhi, 190–192
ICLEI. See International Council for Local	Internal Displacements (IDPs), 71–72
Environmental Initiatives (ICLEI)	International Business Machines (IBM), 13
IDCO. See Industrial Infrastructure Development	International Council for Local Environmental
Corporation (IDCO)	Initiatives (ICLEI), 338, 359
Ideal ambient atmosphere, 186	International Energy Agency, 437
Identification technologies, 469-470	Invasions, 222
IDPs. See Internal Displacements (IDPs)	IAP, 223-224, 230-232
iFORA. See Intelligent Foresight analytics (iFORA)	status, 228t
IGBC. See Indian Green Building Council (IGBC)	Invasive alien plants (IAPs), 222–223
IGP. See Indo-Gangetic plain (IGP)	composition, 229
IISc. See Indian Institute of Science (IISc)	difference in IAP species abundance and richness,
Image classification methods, 38–39	230-231
Image time-series, 41	field sampling and experimental design, 226-227
Incineration, 254–255	habitat condition, 226t, 231–232
Inclusion of gamification, 166–167	plant species across habitat types, 228t
Inclusive green of cities to gentrification, 123	practical implications for management, 232–233
Incompetent planning, 168–173	principal component analysis, 227, 228f
India	regression analysis, 230f
disasters and displacement in, 74-76	results, 227–229
disaster induced displacement, 76f	site selection, 225-226, 225f
disaster-wise average annual displacement, 75f	statistical analyses, 227
population in India in last decade, 75t	study area, 224–225

Invasive plant species, 490–493 IO model. See Input–output model (IO model) ISKCON temple, 148–150, 151f, 153f ISODATA, 38–39	Liège Food Land Belt, The, 139–140 Life cycle carbon emissions assessment, 146 Life-cycle assessment (LCA), 364 Linking urban metabolism research with design,
Isoprene, 189	25–26
IT sector. See Information technology sector (IT	Liquid waste, 242
sector)	wastewater, 242
IVB. See Innsbrucker Verkehrsverbund (IVB)	Livelihood, 79
ĭ	chaos in relief distribution, 80f
J JoBike, 178–179	Local Governments for Sustainability. See International Council for Local Environmental Initiatives (ICLEI)
K	Locally Unwanted Land Use (LULUs), 117, 122
k-means, 38–39	urban greenspace as, 122
Kappa coefficient, 40–41, 56–57	Lolium multiflorum x Liliom perene, 227
Koppen climate classification, 53	Long Term Ecological Research Program in United
Kosi floods (2008), 76–79, 77t	States (LTER), 20, 24–25
healthcare and infrastructure, 77–78	Long-range communication technologies, 469–470
land-use planning, 79	LSD posthoc test. See Least Significant Difference
livelihood, 79	posthoc test (LSD posthoc test)
security, law and order issues, 78	LST. See Land Surface Temperature (LST)
water, sanitation and hygiene, 77	LTER. See Long Term Ecological Research Program in United States (LTER)
L	LULUs. See Locally Unwanted Land Use (LULUs)
Lagging HDI, 82	Lycopersicon esculentum. See Tomato (Lycopersicon
Land Surface Temperature (LST), 50–51, 57–59, 62, 63f	esculentum)
Land use, 51–52	M
analysis, 56–57, 57t, 59–62, 61f	Majority filter, 40
analysis, 56–57, 57t, 59–62, 61f land cover change, 12	Majority filter, 40 Manganese, 307
land cover change, 12	Manganese, 307
land cover change, 12 planning, 79	Manganese, 307 Manufacturing and recycling process, 22–23
land cover change, 12 planning, 79 growth of settlements in refugee camp area of	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18
land cover change, 12 planning, 79 growth of settlements in refugee camp area of	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40—41	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40—41 change detection analysis, 43—44	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL)
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40—41 change detection analysis, 43—44 Landsat series, 55, 56t	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA)
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40–41 change detection analysis, 43–44 Landsat series, 55, 56t post Landsat 3, 57	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS)
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40–41 change detection analysis, 43–44 Landsat series, 55, 56t post Landsat 3, 57 Landsat-5 mission, 36–37	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS) MEA. See Millennium Ecosystem Assessment (MEA)
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40–41 change detection analysis, 43–44 Landsat series, 55, 56t post Landsat 3, 57	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS)
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40–41 change detection analysis, 43–44 Landsat series, 55, 56t post Landsat 3, 57 Landsat-5 mission, 36–37 satellite images, 41–42	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS) MEA. See Millennium Ecosystem Assessment (MEA) Mean annual cycle, 190, 191f
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40–41 change detection analysis, 43–44 Landsat series, 55, 56t post Landsat 3, 57 Landsat-5 mission, 36–37 satellite images, 41–42 Landsat-7 satellite, 37	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS) MEA. See Millennium Ecosystem Assessment (MEA) Mean annual cycle, 190, 191f Megacities, 201–202, 337
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40–41 change detection analysis, 43–44 Landsat series, 55, 56t post Landsat 3, 57 Landsat-5 mission, 36–37 satellite images, 41–42 Landsat-7 satellite, 37 Landsat-8 bands, 36–37	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS) MEA. See Millennium Ecosystem Assessment (MEA) Mean annual cycle, 190, 191f Megacities, 201–202, 337 of future, 202, 204f
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40–41 change detection analysis, 43–44 Landsat series, 55, 56t post Landsat 3, 57 Landsat-5 mission, 36–37 satellite images, 41–42 Landsat-7 satellite, 37 Landsat-8 bands, 36–37 Landscape	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS) MEA. See Millennium Ecosystem Assessment (MEA) Mean annual cycle, 190, 191f Megacities, 201–202, 337 of future, 202, 204f global water management
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40—41 change detection analysis, 43—44 Landsat series, 55, 56t post Landsat 3, 57 Landsat-5 mission, 36—37 satellite images, 41—42 Landsat-7 satellite, 37 Landsat-8 bands, 36—37 Landscape landscape-based studies, 10	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS) MEA. See Millennium Ecosystem Assessment (MEA) Mean annual cycle, 190, 191f Megacities, 201–202, 337 of future, 202, 204f global water management changing agendas in, 214f
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40–41 change detection analysis, 43–44 Landsat series, 55, 56t post Landsat 3, 57 Landsat-5 mission, 36–37 satellite images, 41–42 Landsat-7 satellite, 37 Landsat-8 bands, 36–37 Landscape landscape landscape-based studies, 10 modelling and prediction, 59, 62–65	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS) MEA. See Millennium Ecosystem Assessment (MEA) Mean annual cycle, 190, 191f Megacities, 201–202, 337 of future, 202, 204f global water management changing agendas in, 214f clusters stream graph, 214f
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40–41 change detection analysis, 43–44 Landsat series, 55, 56t post Landsat 3, 57 Landsat-5 mission, 36–37 satellite images, 41–42 Landsat-7 satellite, 37 Landsat-8 bands, 36–37 Landscape landscape landscape-based studies, 10 modelling and prediction, 59, 62–65 position, 304	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS) MEA. See Millennium Ecosystem Assessment (MEA) Mean annual cycle, 190, 191f Megacities, 201–202, 337 of future, 202, 204f global water management changing agendas in, 214f clusters stream graph, 214f life-cycle chart of clusters, 215f
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40–41 change detection analysis, 43–44 Landsat series, 55, 56t post Landsat 3, 57 Landsat-5 mission, 36–37 satellite images, 41–42 Landsat-7 satellite, 37 Landsat-8 bands, 36–37 Landscape landscape-based studies, 10 modelling and prediction, 59, 62–65 position, 304 Law and order issues, 78	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS) MEA. See Millennium Ecosystem Assessment (MEA) Mean annual cycle, 190, 191f Megacities, 201–202, 337 of future, 202, 204f global water management changing agendas in, 214f clusters stream graph, 214f life-cycle chart of clusters, 215f semantic map and clusters, 214f
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40—41 change detection analysis, 43—44 Landsat series, 55, 56t post Landsat 3, 57 Landsat-5 mission, 36—37 satellite images, 41—42 Landsat-7 satellite, 37 Landsat-8 bands, 36—37 Landscape landscape-based studies, 10 modelling and prediction, 59, 62—65 position, 304 Law and order issues, 78 LCA. See Life-cycle assessment (LCA)	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS) MEA. See Millennium Ecosystem Assessment (MEA) Mean annual cycle, 190, 191f Megacities, 201–202, 337 of future, 202, 204f global water management changing agendas in, 214f clusters stream graph, 214f life-cycle chart of clusters, 215f semantic map and clusters, 214f structure dynamics of clusters, 215f
land cover change, 12 planning, 79 growth of settlements in refugee camp area of Saharsa, 80f and safe housing, 86 Land-cover accuracy, 40–41 change detection analysis, 43–44 Landsat series, 55, 56t post Landsat 3, 57 Landsat-5 mission, 36–37 satellite images, 41–42 Landsat-7 satellite, 37 Landsat-8 bands, 36–37 Landscape landscape-based studies, 10 modelling and prediction, 59, 62–65 position, 304 Law and order issues, 78 LCA. See Life-cycle assessment (LCA) Least Significant Difference posthoc test (LSD	Manganese, 307 Manufacturing and recycling process, 22–23 Mass balance methods, 22–23 Material Flow Analysis (MFA), 18 family, 18 Material footprints, 103 Maximum Likelihood, 39 MBBL. See Model Building Byelaws (MBBL) MCA. See Multiple correspondence analysis (MCA) MDS. See Metric multidimensional scaling (MDS) MEA. See Millennium Ecosystem Assessment (MEA) Mean annual cycle, 190, 191f Megacities, 201–202, 337 of future, 202, 204f global water management changing agendas in, 214f clusters stream graph, 214f life-cycle chart of clusters, 215f semantic map and clusters, 215f literature review, 203–210

Megacities (Continued)	Multielement mass-balance accounts, 22–23
results, 211–215	Multimethod approach, 120
system, 202	Multiple correspondence analysis (MCA), 481
word clouds, 213f	Multispectral bands, 36–38
urban water management, 203–207	Municipal solid waste (MSW), 241–242, 247, 272
publication activity, 207f	landfilling of, 255
Mental and physical wellbeing, 115	recycling, 253
Mental health, 119–120	unregulated disposal of, 253
Metal waste, 243–244	Municipal solid waste compost (MSWC), 273–274,
Methodological techniques, 208	279—280
Metric multidimensional scaling (MDS), 481	generation, 247
MFA. See Material Flow Analysis (MFA)	Municipal waste generation, 457-460
Micromobility modes, 164	NT
Migration, 86	N
Millennium Ecosystem Assessment (MEA), 96 Mineral dust–mediated photochemical reactions, 189	National and State Disaster Management Authorities (NDMA), 73–74
Minimum Distance, 39	National Disaster Management Plan advices, 72
Ministry of Housing and Urban Affairs (MoHUA),	Natural aerosols over Delhi, 190–192
449-450	Natural atmospheric cycles, 50-51
Mixed nutrient recovery technologies, 270-272	Natural disaster induced migration in/from Odisha,
aerobic composting/vermicomposting, 272	79-85
anaerobic digestion, 271	infrastructure and agriculture, 82-83
pyrolysis, 271–272	lagging HDI, 82
Mixed waste, 461–462	political awareness and assertion, 83-85
MMC. See Montreal Metropolitan Community	Natural ecosystems, 22
(MMC)	Natural environments, 222–223
MNDWI. See Modified Normalized Difference Water	Natural resource consumption, 146
Index (MNDWI)	Nature-based solutions, 25–26
MNNIT. See Motilal Nehru National Institute of	Nature-inspired techniques, 59
Technology (MNNIT)	NDMA. See National and State Disaster Management
Modal shift in urban transport, 166–168	Authorities (NDMA)
Model Building Byelaws (MBBL), 446	NDVI. See Normalized Difference Vegetation Index
Modelling techniques, 12	(NDVI)
Modelling urban ecosystem and valuation of	Net ecosystem exchange (NEE), 306
services, 101–104	Net Present Value (NPV), 148
ecological footprint, 101	New urbanism approach, 424–425
urban metabolism, 101	Newtonian, 92
Modes, social hindrance and negative reaction from,	Nitrogen, 5, 18, 24–25, 186
168–173	biological N recovery, 269
Modified Normalized Difference Water Index	physicochemical recovery of N from biomass, 269
(MNDWI), 39	Nitrogen oxides (NOx), 465–466
MoHUA. See Ministry of Housing and Urban Affairs	Noise reduction, 98
(MoHUA)	Nonconvention energy, 450
Monetary valuation, 103–104	Nonessential toxic elements, 252
Monoterpenes, 189	Nonexhaust emission, 187
Monte Carlo iterations, 59	Nongovernmental actors, 123
Montreal Food System, 139–140	Nonhazardous wastes, 246
Montreal Metropolitan Community (MMC), 134–135,	Nonmethane hydrocarbons, 465–466
135f Matilal Nahru National Institute of Technology	Normalized Difference Vegetation Index (NDVI), 39,
Motilal Nehru National Institute of Technology (MNNIT), 147	57, 58t, 320–321 Northwesterly (NW), 194–195
MSW. See Municipal solid waste (MSW)	NOx. See Nitrogen oxides (NOx)
MSWC. See Municipal solid waste (MSWC)	NPV. See Net Present Value (NPV)
vuote composi (141044C)	111 See I tel I reserve value (1 vi v)

'Nurturing' farmland, 134–135	PDZAs. See Plans de Développement des Zones
Nutrient recovery, 267	Agricoles-or Development Plans for
	Agricultural Zones (PDZAs)
agronomic response of waste stream, 279–289 biosolids, 288–289	Pedestrian urban heat island intensity (PUHII), 380
fertilizer value of waste, 273–278	Peer-reviewed articles, 121
mixed nutrient recovery technologies, 270–272	People, profit and planet approach (PPP approach),
from municipal waste streams, 268f	336
options through waste biorefineries, 268–272	Perionyx excavatus, 272
recovery technologies	Perionyx sansibaricus, 272
nitrogen selective, 269	Periurban zones, 132
phosphorus selective, 269—270	Pesticide wastes, 252
potassium selective, 270	Phosphate, 268
NW. See Northwesterly (NW)	Phosphate accumulating organisms (PAOs), 269–270
1444. See Holdiwesterly (1444)	Phosphorus, 5, 18, 24–25
0	selective, 269–270
Object-based classification, 39	Physical health and active lifestyle, 120
Ocean PArallelize Transport Model-Biological Flux	PIER. See Public Interest Energy Research Program (PIER)
Model (OPATM-BFM Model), 102–103	Pixels, 56
Odisha, natural disaster induced migration in/from,	pixel-based classifications, 39
79-85	Planetary Boundary Layer (PBL), 325-326
OPDs. See Out Patient Department (OPDs)	Plans de Développement des Zones Agricoles-or
Openness to intervention, 208	Development Plans for Agricultural Zones
Optimal SLEUTH metric (OSM), 51–52, 59	(PDZAs), 138–139
Optimization of postclassification processing, 40	Plastic wastes, 243
Organic fertilizer, 273–274	effect of plastic wastes, 250-251
Organic wastes, 244–245	recovery, 254
residential, 245	trade, 256
UOW, 245	Plurality in values, 99-100
'Organism' analogy, 22	valuation, 100
Ornamental horticulture, 231	values, 99–100
Orthodox industrial ecological methods, 19	PM. See Particulate matter (PM)
OSM. See Optimal SLEUTH metric (OSM)	PM _{2.5} . See Fine particulate matters (PM _{2.5})
Out Patient Department (OPDs), 77-78	Policy recommendation, 176-177
Outdoor air pollution, 323	Political awareness and assertion, 83-85
Overall accuracy, 56–57	Political ecology, 17–18
Oxygen, 5, 186	Political-industrial ecology, 17-18
production, 92	Polygons, 56
_	Polymer wastes recycling, 254
P	Population, 202
PAOs. See Phosphate accumulating organisms (PAOs)	population-based stochastic optimization technique, 51–52
Paper waste, 243	Post full calibration process, 62–64
recycling, 254	Postclassification processing optimization, 40
Paradigmatic ecological-urbanism, 25–26	Potassium selective, 270
Paris Agreement, 146	Potential evaporation ratio, 304
Particle size distribution, 301	PPP approach. See People, profit and planet
Particle swarm optimization (PSO), 51-52	approach (PPP approach)
Particle swarm optimization—SLEUTH model (PSO-	Practical applications, UM, 20–21
SLEUTH model), 54, 59, 60f, 65f	Precautionary principle, 93–94
Particulate matter (PM), 23–24, 50–51, 318–319,	Preprocessing, 55
465-466	of satellite imagery, 37–38
PBL. See Planetary Boundary Layer (PBL)	Principal component analysis, 227, 228f
PDF. See Probability density functions (PDF)	Probability density functions (PDF), 56

Producers, 138–140	Residential/household wastes, 248
accuracy, 56–57	RETScreen software, 146-147
Productivist	Rickshaws, 164-165
agriculture, 132–133	Rio Summit, 359
system, 133	Riverside green areas, 112
Provisioning services, 100	Road gravity values reflect highways and transport
PSO. See Particle swarm optimization (PSO)	corridors, 65
PSO-SLEUTH model. See Particle swarm	Rooftop gardening, 490-491
optimization-SLEUTH model (PSO-SLEUTH	Rooftop solar PV system, 159
model)	ROS. See Reactive oxygen species (ROS)
Public auditorium, 156–158, 157t, 159t	RS. See Remote sensing (RS)
Public Interest Energy Research Program (PIER), 20	Ruralization, 355–356
PUHII. See Pedestrian urban heat island intensity	
(PUHII)	S
Pyrolysis, 271–272	SANBI. See South African National Biodiversity
	Institute (SANBI)
R	Sanitation, 77
3R. See Reduce, reuse and recycle (3R)	Santropol Rouland, 142
Radiative skin temperature, 50–51	Satellite image selection, 36–37, 37f
Radio frequency identification, 469-470	Satellite imagery preprocessing, 37–38
Radioactive wastes, 246	Scan Line Corrector (SLC), 37
Radiometric correction, 37–38	Scheduled castes (SC), 82
Radiometric normalization, 37–38	School (primary education), 147-148
Rainwater harvesting, 450	SCI. See Sustainable Cities Index (SCI)
Random Forest, 39	SCPs. See Single cell proteins (SCPs)
Rapid urbanization, 95	SD. See Sustainable development (SD)
RCC. See Reinforced cement concrete (RCC)	SDG. See Sustainable Development Goal (SDG)
RCM. See Regional Municipal Counties (RCM)	SEA. See Strategic Environmental Assessments (SEA)
Reactive nitrogen species, 324–325	Second law of thermodynamics, 93
Reactive oxygen species (ROS), 324-325	Secondary organic aerosols (SOAs), 325-326
Recovery, 254	Security, 78
Recreational experiences, 92	Segmentation, 39
Recyclable wastes, 245	SEJ. See Solar equivalent joule (SEJ)
Recycling, 253–254	Sentinel-2, 38
of MSW, 253	Separate collection
of paper waste, 254	bags, bins and containers for, 465f
of polymer wastes, 254	case study, 471-473
of wastewater, 450	Separated waste
Reduce, reuse and recycle (3R), 258	collection, 461
Regional Municipal Counties (RCM), 138-139	storage and transportation, 463-464
Reinforced cement concrete (RCC), 154-155	SESs. See Social—ecological systems (SESs)
Relative performance, 363–364	Sexual and gender-based violence, 71-72
Relaxed/rationalized labour laws, 82–83	SEZ. See Special economic zone (SEZ)
Remote sensing (RS), 469–470	SFA. See Substance Flow Analysis (SFA)
modelling and, 12	Short-range communication technologies, 469-470
remotely sensed data, 55	Simulation and modelling methods, 208-209
RS-based systems, 470–471	Single cell proteins (SCPs), 269
technology, 9	Single window algorithm, 57-59
Renewable energy, 148	Sky view factors (SVFs), 318
systems, 148	SLC. See Scan Line Corrector (SLC)
Renewable systems, 160	SLEUTH, 51–52
Research proposals, 471	analysis, 59
Residential organic wastes, 245	codes, 62

Slope, 51–52 Smart city, 13, 494	Panchganga Ghat, Thatheri Bazaar and Chaukhamba, 429
Smartphone-based application, 177	Spatial distribution of aerosols component during
SO_4 scattering, 193–194, 194f	seasons, 192–198
SOAs. See Secondary organic aerosols (SOAs)	BC extinction coefficient, 192–193
SOC. See Soil organic carbon (SOC)	dust column density, 194–195
Social Social	SO ₄ scattering, 193–194
exclusion relief camps based on caste hierarchy, 78,	total scattering, 196–198
79f	Spatial technologies, 469–470
hindrance and negative reaction from modes, 168–173	Spatial urban growth pattern exposition using PSO- SLEUTH
inclusiveness, 405–406	method, 54–59, 54f
inequity in access to greenspace as environmental	data acquisition, 55
justice issue, 121	extraction of features, 55
networks, 490–491	land surface temperature, 57–59, 62
Social cost of carbon (SCC), 102–103	land-use analysis, 56–57, 59–62
Social—ecological systems (SESs), 5–6	landscape modelling and prediction, 59, 62–65
Sociodemographics, 174	preprocessing, 55
Socioeconomic	results and discussion, 59–65
activities, 12–13	study area, 52–53, 52f
flows, 23–25	Spatio-temporal analysis, 38
subsystem, 18–19	Special economic zone (SEZ), 82–83
system, 18	Squash (Cucurbita maxima), 279–280
Soil bulk density, 301	SSR. See Swartland Shale Renosterveld (SSR)
and porosity, 306–307	Stakeholders, 124
Soil CO ₂ efflux, 300–301, 303–306, 308	Storm water flows, 23–24
Soil moisture, 50–51, 307	Strategic Environmental Assessments (SEA), 360
Soil organic carbon (SOC), 301, 304	Stressors of disaster-induced displacement and
stocks, 301–302	migration in India
Soil organic matter (SOM), 267, 304–308	case studies
Soil pH, 301, 307	Kosi floods (2008), 76–79
Soil porosity, 301	natural disaster induced migration in/from
Soil respiration. See Soil CO ₂ efflux	Odisha, 79–85
Soil texture, 306	disaster
Solar equivalent joule (SEJ), 18-19	and climate change induced displacements, 73-74
Solar hot water hybrid system, 154–155, 155f,	and displacement in India, 74–76
156t	discussion, 85–86
Solar PV, 152–153	Substance Flow Analysis (SFA), 18
power generation system, 148	Substantial infrastructural improvement, 166–167
Solar radiation, 147	SuDSs. See Sustainable drainage systems (SuDSs)
Solid wastes, 241-242	Sulphur, 5
garbage/trash, 241–242	Super cyclones, 81
management, 77, 85–86	Supervised classification, 39
SOM. See Soil organic matter (SOM)	Support Vector Machines (SVM), 39
South Africa, 223–225, 231	Sustainability. See also Urban sustainability
South African National Biodiversity Institute	assessment
(SANBI), 225	of agricultural produce and food produce, 138-140
Southwesterly (SW), 194-195	of economic system, 92–93
Space syntax analysis, 421	gap, 101
analysis, 425–429	issues, 207
Assi Ghat and Pushkar Kund, 426	management in cities, 337-340
Dhashashwamedh Ghat, main road and market	Sustainable agricultures, 138
area, 426–428	and healthy food produce, 141–142

Sustainable Cities Index (SCI), 336	Telecoupling, 208
Sustainable city, 13	Temperature, 303–304
Sustainable development (SD), 8, 92–93, 336,	and urban microclimate, 188
356—357, 362	Temple complex, 148–153
Sustainable Development Goal (SDG), 338, 415	Temporal land use analysis for Rangalore 50, 61
SDG 11, 299–300	Temporal land-use analysis for Bangalore, 59–61
Sustainable drainage systems (SuDSs), 23–24	Terrestrial ecosystems, 95
Sustainable mobility, 164 Sustainable urban redevelopment	2,3,7,8-Tetrachlorodibenzo- <i>p</i> -dioxins (TCDD), 250 The Economics of Ecosystem Services and
concept of urban village neighbourhood, 383–384	Biodiversity (TEEB), 94
ecologies of urban villages, 401–404	Thermal Infrared region of EM waves, 55
environmental effects of informal settlements within	Threshold, 363–364
cities, 379–380	Time series
informal settlements in global, 378–379	analysis, 43
investigation of Hubei village neighbourhood,	data analysis of Google Earth images, 79
385–397	Time—space evolution and factors, 96
objectives and analytical methods, 380	Tomato (<i>Lycopersicon esculentum</i>), 279–280
reflections of existing urban design practices,	Top-down approach, 362
397–401	Total aerosol (TA), 190
limitations of strategy of 'reduce density', 400–401	Total dust column density (TDCD), 190
main strategies for urban village redevelopment,	Total hydrocarbon, 465–466
400	Total scattering, 196–198, 196f
necessity of innovative thinking and a more	average mass concentration, 197t
flexible approach, 401	Toxic elements, 252
urban villages, 381–383	Toxic waste, 250
Sustainable urban transport mode, 168–169	Transdisciplinary nature of urban ecology, 480–481
Sustainable water management in megacities,	Transition in Innsbruck, 173–176
207-210	Transportation, 51–52
methodology, 210-211	Tropical savanna climate, 53
publication activity, 212f	Tropospheric ozone, 186
results, 211–215	
system, 202	U
word clouds, 213f	UHI. See Urban Heat Island (UHI)
SVFs. See Sky view factors (SVFs)	ULTRA-Ex. See Urban Long-Term Research Areas
SVM. See Support Vector Machines (SVM)	(ULTRA-Ex)
SW. See Southwesterly (SW)	UM. See Urban metabolism (UM)
Swartland Shale Renosterveld (SSR), 225	UN Global Assessment Report (2019), 85
Swartland Shale Renosterveld, 233	United Nations Development Programme (UNDP),
Systematizing growing evidence-base on	173
nature-based solutions, 25–26	United Nations University Institute of Advanced
Système Alimentaire Montréalais, 139–140	Studies (UNU-IAS), 20
T.	Unregulated disposal, 253
T	of MSW, 253
TA. See Total aerosol (TA)	Unsupervised classification, 38–39
Tabula Rasa approach, 417	UNU-IAS. See United Nations University Institute of
Target value, 363–364	Advanced Studies (UNU-IAS)
TCDD. See 2,3,7,8-Tetrachlorodibenzo-p-dioxins	UOW. See Urban organic wastes (UOW)
(TCDD)	Urban, 51–52
TDCD. See Total dust column density (TDCD)	agglomeration, 10, 132
Techno-economic feasibility, 147	air pollution, 187–188
Technology-oriented government service, 177	areas, 222–223
TEEB. See The Economics of Ecosystem Services and	atmosphere, 186
Biodiversity (TEEB)	boundary, 9–11

buildings, 159	methodology, 481
design and planning, 14	transdisciplinary nature, 480–481
dwellers, 50	Urban ecology, 4–5, 8–14, 8f–9f, 17–18, 131–132,
ecological footprint, 13	132t, 420
environment, 185–186	biogeochemical models, 25–26
green space quality, 121	disaster risk reduction, 12
greenery, 490–491	economies of scale, 12–13
infrastructure, 189	
meteorology, 318–319	governance and planning, 14
	human health, 13–14
microclimate, 188	integrated approach, 14
mining, 459	land use land cover change, 12
oasis effect, 318	modelling and remote sensing, 12
pollutant emission flux and fate in cities around	SESs and urban metabolism, 5–6
world, 186–187	smart city, 13
population of India, 442–443	state of research in, 7–8
resilience, 73–74	country-wise division of urban ecology research
resource flows, 18	(2009–2019), 7–8
sites, 226	global trends in past two decades (1999–2019), 7
transport, modal shift in, 166-168	sustainable city, 13
transportation, 164–165	urban boundary, 9–11
'urban nexus' perspective, 18	urban ecological footprint, 13
vegetation, 188	urban metabolism, 11–12
wastewater, 95	urban sustainability indicators, 13
Urban agriculture roles, 131–132, 132t, 134	Urban ecosystems, 4, 18, 20, 299-301
and food security, 134–138	services, 96–98, 97f
productivist agriculture, 132–133	valuation, 104
Urban air quality, 189	in transformation process, 420–421
of Delhi, 190–198	Urban green space, social equity and human
spatial distribution of aerosols component during	wellbeing
seasons, 192–198	Australia, 112
temporal evolution and interannual variability,	Australian research on environmental justice, 121–122
190–192	discussion, 122–124
Urban cycling, 166–173	collaboration, 124
barriers in cycling, 168–173	demographic considerations, 123
modal shift in urban transport, 166–168	inclusive green of cities to gentrification, 123
Urban design assessment, 414–415, 429–431	innovative approaches, 123–124
analysis based on space syntax technique, 425–429	Greater Sydney, 113
extracting and analysing spaces, 424–425	demographics, 113
in Indian context, 421–424	employment, 115
problem and research question, 416-421	greenspace, 118–119
living historical cities, 417–418	mental and physical health benefits of urban
planning, 418–421	greenspace, 119–120
Urban ecological systems, 480-481. See also	methodology, 115
Ecological/ecology	peer-reviewed articles on urban greenspace and
challenges and opportunities, 486	health, 116t
challenges in, 487t–490t	quality of urban green space, 121
ecology of cities, 486–493	Results, 115–117
evolution of major research fields and challenges,	social inequity in access to greenspace as
484–486	environmental justice issue, 121
integration with other themes and emerging fields,	urban greenspace as LULU, 122
482–484	urbanization as health challenge, 117–118
major research fields in, 481	Urban growth, 436
management and sustainability, 493–494	models, 51–52
management and sustainability, 170 171	11104010, 01 02

Urban growth pattern, 64–65	factors affecting urban soil carbon concentration and
detection and analysis, 41–42	stock, 304–308
accuracy assessment of classification, 40-41	interactions of multiple factors, 308
image classification methods, 38–39	soil bulk density and porosity, 306-307
optimization of postclassification processing, 40	soil CO ₂ efflux, 305–306
preprocessing of satellite imagery, 37–38	soil moisture, 307
satellite image selection, 36-37	soil pH, 307
urbanization detection on image time-series, 41	soil texture, 306
results and analysis, 41-44, 42f, 42t	SOM, 307-308
sums of land-cover class change, 46f	functions and ecosystem services, 305f
time-series growth pattern change detection	Urban sustainability, 357
analysis, 45f	indicators, 11–13
Urban Heat Island (UHI), 50-51, 318-321	Urban sustainability assessment
global scenario, 320	challenges in, 364–370
and health effects, 321–322	key sustainability actors during the building life
Indian scenario, 320–321	span, 368f
mitigation and adaptation techniques and local and	sustainability assessment framework, 371f
global effects, 329t	evolution of urban sustainability, 359–361
Urban Long-Term Research Areas (ULTRA-Ex), 20,	urban sustainability in Europe, 359–361
24–25	indicators of urban sustainability, 362–364
Urban metabolism (UM), 5–6, 11–12, 17–18,	methodology, 358
101–103	recent development, 361–362
carbon metabolism, 102–103	Urban thermal field variance index (UTFVI), 320–321
challenges and frontiers for UM research	Urban villages
distinct conceptual underpinnings and common	in Chinese cities, 381
methods, 21–23	ecologies of, 401–404
interdependency between biogeochemical cycles	shared amenity/welfare, 403–404
and socioeconomic flows, 23–25	shared environment, 402–403
linking urban metabolism research with design, 25–26	shared social capital, 404 shared space, 403
energy metabolism, 101–102	<u> •</u>
	misperception of urban villages' physical
material footprints, 103	environment, 381
monetary valuation, 103–104	neighbourhood, 383–384
variety of methods, 17–20	underestimated environmental aspects of, 382–383
variety of practical applications and end-users,	urgency and challenges in city of Shenzhen, 383
20-21 Lirban arganic wastes (LIOW), 245	Urban waste compost (UWC), 279–280
Urban organic wastes (UOW), 245	Urban waste types, 241–246
Urban settlement, ecosystem services and	CDW, 246
valuation in	ceramics and glass wastes, 244
challenges in valuation of urban ecosystem services,	hazardous wastes, 245–246
104	liquid waste, 242
ecosystem disservices, 98	metal waste, 243–244
modelling urban ecosystem and valuation of	nonhazardous wastes, 246
services, 101–104	organic wastes, 244–245
urban ecosystem services, 96–98	paper waste, 243
valuation of urban ecosystem services, 99–100	plastic wastes, 243
Urban soils, 300–302	radioactive wastes, 246
carbon cycle with natural and anthropogenic carbon	recyclable wastes, 245
flux, 300f	solid wastes, 241–242
carbon dynamics, 303–304	Urban water management in megacities, 203–207
as CO ₂ source or sink, 302–303	publication activity, 207f

Urbanization, 5, 35–36, 50, 92–96, 146, 185–186, 222, 240–258, 299–300, 318–319, 337, 355–356,	architectural expression, 423–424 living history, 421–423
482-484	Variability, 137
air pollution, 322–323	VC. See Ventilation coefficient (VC)
and human health nexus in era of climate change,	'Vegan' R package, 227
326	Vehicular emission, 187
and anthropogenic air pollution, 325–326	Ventilation coefficient (VC), 186, 189
approaches to waste management, 253–255	Vermicompost, 273–274, 279–280
anaerobic digestion, 255	Volatile organic compounds (VOCs), 98, 186
burial/landfilling, 255	volutile organic compounds (voes), 70, 100
incineration, 254–255	W
recovery, 254	Waste, 240
recycling, 253–254	composition, 461–462
unregulated disposal, 253	disposal, 4
	•
detection on image time-series, 41	material, 13
disposal methods of urban wastes, 255–258	separation by households, 462–463
attenuation, 256–257 isolation, 257–258	Waste electrical and electronic equipment (WEEE), 248–249, 460–461, 471–473
submergence, 255–256	Waste management, 240
trade, 256	system, 460
generation of wastes, 246-250	key players and responsibility levels, 460f
green building effort and, 447	Wastes collection and transportation, 459
growth pattern, 41	application of information technologies, 469-471
as health challenge, 117–118	circular economy concept, 459f
impacts of urbanization on ecosystem and services,	European emission standards
96	for heavy-duty diesel engines, 468t
policy recommendations, 327-330	for light commercial vehicles, 467t
air quality mitigation and adaptation strategies, 329–330	novel solutions in automation of waste management, 469–471
green cover and water body rejuvenation, 327–328	storage and transportation of separated waste, 463–464
urban design and infrastructure, 327	technical data of refuse collection vehicles, 468t
types of urban wastes, 241–246	urban city streets design, 466f
ÚHI, 319–321	vehicles with reduced emissions and electric
and health effects, 321-322	vehicles, 464-469, 467f
waste effects on life/urban ecology, 250–253 effects on animal life, 250–251	waste categories and fate of waste streams from households, 460–463
effects on plant life, 252–253	waste treatment in selected countries, 463f
US and European research, 121	Waste ucament in selected countries, 4031 Wastewater, 242, 274–276, 280–288
UTFVI. See Urban thermal field variance index	Water, 50, 77
(UTFVI)	body rejuvenation, 327–328
(U11-V1) UV rays, 92	
	conservation, 450 cycle, 5
UWC. See Urban waste compost (UWC)	
V	management systems, 25–26
•	pollution, 252
Valuation, 100	water-agro-food systems, 18
conventional ecology, 100	WCED. See World Commission of Environment and
conventional economics, 100	Development (WCED)
ecological economics, 100	Web of Science (WoS), 203
environmental economics, 100	database, 481
of urban ecosystem services, 99–100, 104 Varanasi, urban design assessment in	WEEE. See Waste electrical and electronic equipment (WEEE)

WHO. See World Health Organization (WHO)
Wild ecosystems, 22
World Commission of Environment and Development (WCED), 356–357
World Health Organization (WHO), 77–78, 117–118, 187–188, 319–320 WorldView (high-resolution satellite imagery), 38 WorldView-4 satellites, 38 WoS. *See* Web of Science (WoS)

Z Zoeller E-PTO, 469