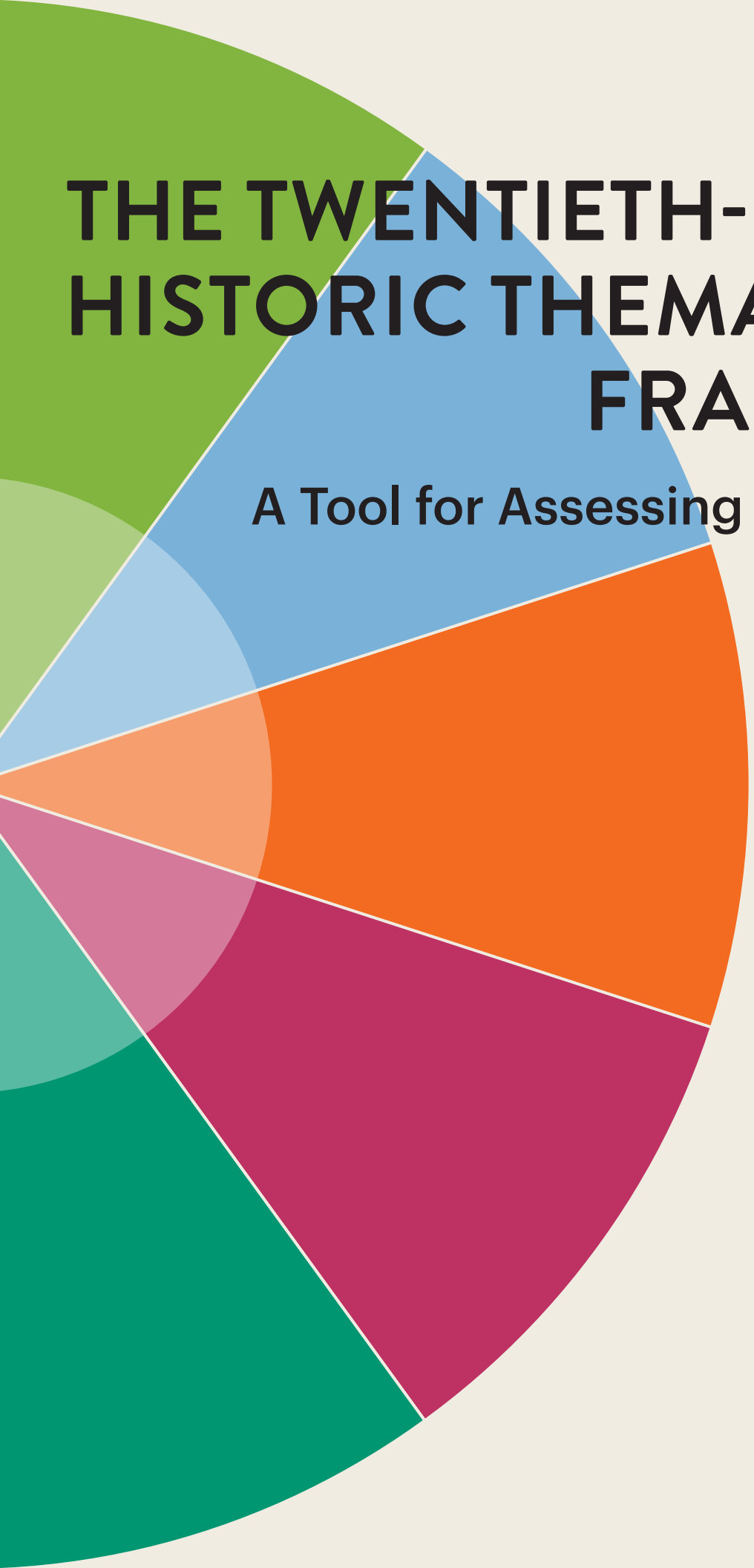

THE TWENTIETH-CENTURY HISTORIC THEMATIC FRAMEWORK

A Tool for Assessing Heritage Places

Susan Marsden
and Peter Spearritt

With contributions from
Leo Schmidt, Sheridan Burke,
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Getty
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ISBN: 978-1-937433-84-0 (online resource)
ISBN: 978-1-937433-83-3 (print on demand)

The Getty Conservation Institute (GCI) works internationally to advance conservation practice in the visual arts—broadly interpreted to include objects, collections, architecture, and sites. The Institute serves the conservation community through scientific research, education and training, field projects, and the dissemination of information. In all its endeavors, the GCI creates and delivers knowledge that contributes to the conservation of the world's cultural heritage.

Contents

Foreword

Internationally, interest in the conservation and promotion of twentieth-century heritage places continues to grow, yet significant places of the modern era are absent or underrepresented in most heritage surveys, from local inventories to World Heritage nominations. Many modern heritage sites and places are at risk through lack of public awareness, and the demolition of important sites continues.

In 2009, the ICOMOS ISC20C (the International Scientific Committee on Twentieth Century Heritage) initiated an ambitious project to respond to these ongoing threats and to catalyze action for holistically identifying twentieth-century heritage sites and places using a thematic approach. In 2011, the Getty Conservation Institute agreed to advance this effort. The GCI established a project to develop this historic thematic framework, creating an international project reference group to advise it and commissioning consultants to prepare the framework analysis.

International experience has shown that a thematic approach to identifying heritage places successfully broadens survey outcomes by analyzing historical contexts and linkages. Such an approach ensures that thematically related places are identified, rather than focusing on chronological analysis alone or on architectural styles or sites that are simply visually or historically prominent.

This thematic framework identifies the principal social, technological, political, and economic drivers that shaped and reshaped the world throughout the twentieth century. It provides a list of the types of sites and places that are indicative of these historic themes as an avenue to prompt reflection and research that will inform heritage surveys and analysis.

It is our hope that the framework will serve as a useful tool for professionals, heritage agencies, and communities needing to recognize, conserve, and interpret their significant twentieth-century heritage places by structuring areas of research and survey. We believe that the thematic approach will help investigators think broadly about identifying the places and sites that define these historical processes.

The ICOMOS ISC20C has continued to collaborate with the GCI on this stimulating and fruitful project. We are pleased now to present, together, the outcome of this work, which has involved the contributions of many colleagues over an extended period. We look forward to seeing it in use and receiving feedback as it is implemented in places far and wide.

Sheridan Burke

Secretary General, ICOMOS International Scientific Committee on Twentieth Century Heritage

Susan Macdonald

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Introduction

The Twentieth-Century Historic Thematic Framework is a tool to identify and contextualize heritage places. It promotes broad thinking about the historical processes that shaped the world's twentieth-century built environment. Although globally structured, this framework can be used locally to survey and assess places within the context of the twentieth century and to conduct comparative analyses of places.

In developing the framework, a vast array of possible themes and topics were distilled into a manageable group of ten interconnected, historic themes. A diagram of these themes and their relation to places is shown in figure 1. Each of the ten themes is explored in an essay that explains related events and phenomena. The essays also discuss subthemes that further articulate the main theme. Each concludes with a photo gallery that illustrates some of the types of buildings, structures, and landscapes that represent the theme. For a breakdown of the ten themes, their respective subthemes, and the types of places that represent them, see the section "Twentieth-Century Themes, Subthemes, and Places That Exemplify Them" on pages 10–15 following this introduction.

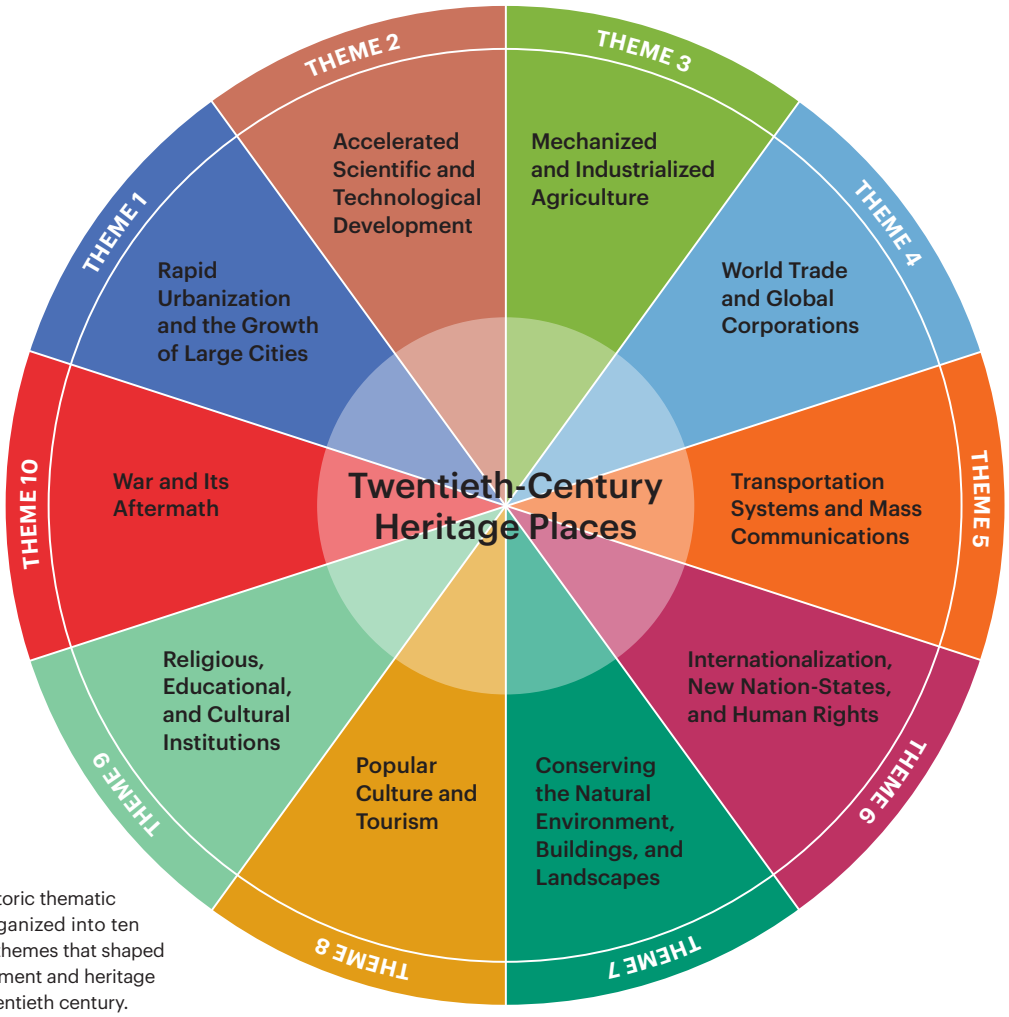

Figure 1. The historic thematic framework is organized into ten interconnected themes that shaped the built environment and heritage places of the twentieth century.

Thematic frameworks are currently being used to identify and assess heritage places in countries such as Australia, Canada, New Zealand, and the United States, and internationally by the UNESCO World Heritage Centre, ICOMOS (the International Council on Monuments and Sites), and other heritage organizations. This demonstrates that the thematic approach assists in broadening heritage survey outcomes by encouraging the identification of places that represent the full range of historical experiences and evidence. It does so by enabling the analysis and delineation of historical themes, creating important connections between thematically related places that are then identified and assessed in context, rather than focusing on chronological analysis or architectural history alone.

This framework provides a historical context for professionals, heritage agencies, and communities seeking to identify, compare, conserve, and interpret the heritage places of the twentieth century holistically and responsibly (see the sidebar on p. 9 on how to use the framework). It is *not* intended to serve as a history of the twentieth century, nor is it a database of significant sites. Rather, it is an analysis of the century's development, emphasizing global forces, trends, and phenomena (i.e., the themes and subthemes) that shaped the twentieth century's built environment in order to prompt broad thinking in heritage survey and assessment work.

Key social, technological, political, environmental, and economic drivers of change that shaped the world from 1900 to 2000 are synthesized and discussed in the ten thematic essays. These drivers include human activities and interactions with the environment that were characteristic of this period of time, if not always unique to it. These actions resulted in the development of new construction materials and methods that facilitated the creation of a number of new building types in the twentieth century, including airports, radio towers, parking garages, and public housing, to name just a few. Rapid political and economic change, shifts in urban settlement patterns, and accelerating scientific and technological advances are among the factors that shaped the century's built and natural environments. Such factors also transformed agricultural production and industrial practices, the growth of world trade, and all forms of transportation and communication, along with the infrastructure that supported them. The themes also recognize new forms of leisure, popular culture, and cultural institutions, the advent of mass tourism, and the heritage and nature conservation movements.

Many of the trends discussed originated and evolved in the nineteenth century or earlier, but the ten themes identified in this framework accelerated, expanded, or evolved rapidly during the twentieth century. No hierarchy is implied in the order in which these themes are presented; there is, of necessity, considerable overlap between them.

Not all of the themes are relevant to every geographic region in the same way. For example, by the middle of the twentieth century, industrialized agriculture had spread to many countries but had only just begun to take hold in others; in many parts of the world, it coexisted with subsistence farming. Although the framework attempts to be comprehensive, it cannot be fully definitive. Every region of the world has developed in its own way and has been impacted differently and at different times by these common global forces, trends, and phenomena.

The authors of this document hail from Australia, the United States, and Europe. Although every attempt has been made to represent and discuss the themes from a global perspective, there is likely a Western bias to the discussion and terminology. Readers are encouraged to interpret the themes for their own regions and look for ways to apply them to their own histories. Each essay attempts to provide a global context for its specific theme and to cover many subjects that convey the breadth of that theme, yet it cannot be encyclopedic in scope. For this reason, readers should consider the essays as a springboard for further research and reflection.

The Twentieth-Century Historic Thematic Framework is offered freely for use, trial, debate, and discussion to support the conservation of significant heritage places of the twentieth century. It is a tool that can be utilized and adapted by anyone involved in heritage conservation around the world. Our hope is that it will aid many forms of research, analysis, and survey work, and ultimately help sustain and conserve the heritage of the twentieth century.

How to Use the Twentieth-Century Historic Thematic Framework

This framework is a means of organizing history to identify and contextualize sites, people, and events. Using and adapting the themes of the Twentieth-Century Historic Thematic Framework will help users to do the following:

IDENTIFY / SURVEY / ASSESS

- Understand more fully the historical development and context of an area or place
- Develop a checklist of the main site types of twentieth-century places to be found in an area
- Comparatively assess a site's rarity or representativeness using significance criteria
- Identify gaps in knowledge about an area's history on which to focus future research or studies
- Engage communities, historians, museum staff, and other local stakeholders
- Identify a diverse range of heritage places

CONNECT / PROTECT / CONSERVE

- Record and analyze layers of twentieth-century stories and associations for significant places
- Build stakeholder networks of owners, scholars, teachers, communities, and museums involved with conserving twentieth-century places
- Prepare listing/designation nominations to protect significant twentieth-century sites
- Develop conservation plans to manage and conserve significant twentieth-century places
- Identify at-risk places that may be unrecognized, underappreciated, under threat of development, or suffering deterioration or damage
- Support improved funding and grant applications for conserving significant places or undertaking further research

INTERPRET / PROMOTE / RECORD

- Extend the interpretation of heritage places by telling their specific twentieth-century stories
- Coordinate promotion of places and raise public awareness around twentieth-century themes
- Identify people associated with the places and determine whether oral history research would be valuable
- Develop historic research strategies to expand on local or national twentieth-century themes
- Publish and promote survey outcomes via publicly accessible databases, public programs, exhibitions or tours, heritage listings/designations, and other activities
- Address neglected or underrepresented themes by stimulating research on potentially significant twentieth-century places
- Record the wide diversity of cultural heritage types and historic themes of the twentieth century

Twentieth-Century Themes, Subthemes, and Places That Exemplify Them

The framework identifies ten overarching, interconnected twentieth-century themes. These themes include a number of related subthemes, which in turn link the overarching themes to individual places. These include many types of buildings, sites, structures, urban settlements, and landscapes that exemplify the themes and subthemes.

The subthemes and types of places listed below represent only a selection. Not all will be relevant in every geographic or political context, and many places embody more than one subtheme. Users are encouraged to identify additional subthemes and types of places based on their own local, national, or regional context.

Theme 1 RAPID URBANIZATION AND THE GROWTH OF LARGE CITIES

Subthemes	Types of Places
• Mass population migration to urban areas and decline of smaller towns • Increasing city size, population, and density • Increasing scale and range of infrastructure needs • Introduction of new energy sources • Improvements in mass transit • The influence of the car and the truck • Expansion and contraction of industrial cities and zones • Defining new forms of urban living: densification and suburbanization • Redeveloping and renewing inner cities	• Refugee camps • Water and sewage systems • Crematoria, mausoleums, and cemeteries • Waste management and recycling facilities • Power plants and infrastructure • High-rise buildings and skyscrapers • Urban mass transit stations and infrastructure • Automobile- and truck-related infrastructure and services • Factories and industrial zones • Suburbs • Shopping centers • New towns and planned cities • Social housing and housing estates • Shantytowns • Civic landscapes and public parks

Theme 2 ACCELERATED SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT

Subthemes	Types of Places
• Increasing pace and scale of scientific change • Development and transportation of new energy sources • Development of new building materials and construction techniques • Advances in engineering • Advances in delivery and administration of public health • Development of new medical technologies • Advances in understanding of human behavior and mental health • Application of research to development of products and services • Adaptation of military technology to civilian and commercial use • Space research and exploration	• Oil refineries • Renewable energy installations and power plants • Nuclear sites and power stations • Structures built with new building materials • Structurally innovative buildings and structures • Hospitals and medical facilities, sanatoriums, geriatric care facilities, and mental health facilities • Research and development facilities • Scientific laboratories • Space research sites, launch sites, and satellites

Theme 3 MECHANIZED AND INDUSTRIALIZED AGRICULTURE

Subthemes	Types of Places
• Changing rural landscapes • Agricultural mechanization • Increase in agricultural productivity • Intensive water management and large-scale irrigation • New forms of agricultural processing • New forms of industrial-scale farm production and transportation • Growth of corporate farming • Environmental impacts of agriculture • The Green Revolution • Organic farming and the Slow Food movement • Continuation of subsistence farming	• Irrigation and water management infrastructure • Hydroelectric power stations and rural electrification schemes • Large-scale grain storage • Farm machinery production and storage facilities • Industrial-scale meat and produce production facilities • Industrial-scale food processing and distribution facilities • Agricultural exhibition centers and showgrounds • Monoculture landscapes • Hydroponic and aquaculture farms • Wind and solar farms

Theme 4 WORLD TRADE AND GLOBAL CORPORATIONS

Subthemes	Types of Places
• Decline of economic colonialism • Rise of bilateral and multilateral trading blocs and international trade agreements • Expansion of Asian economies • Rise of multinational corporations and global franchises • Changing port landscapes and the impact of containerization • Internationalization of trade and manufacturing • Expansion of energy import and export	• Massive industrial plants • International manufacturing plants and distribution outlets • Redundant manufacturing facilities and associated transportation systems • Corporate and organizational headquarters and office buildings • Global franchises, such as retail, dining, and hotel • Port facilities, including obsolete ports • Container ports • Oil extraction systems and refineries • Energy production and storage facilities

Theme 5 TRANSPORTATION SYSTEMS AND MASS COMMUNICATIONS

Subthemes	Types of Places
• Expansion of long-distance transport of goods and people • Evolution of older modes of transportation • Introduction of trucks and buses • The introduction and growth of air travel • Expansion and contraction of earlier forms of communications • Development of mass communications • The rise of digital technology	• Railway stations, facilities, and infrastructure • Bridges • Bus stations and networks • Roads, freeways, and motorways • Passenger shipping terminals • Airports and related facilities • Postal facilities • Telecommunications networks and infrastructure • TV and radio broadcasting stations, networks, and facilities • Computer- and internet-related sites

Theme 6 INTERNATIONALIZATION, NEW NATION-STATES, AND HUMAN RIGHTS

Subthemes	Types of Places
• Evolution of totalitarianism, communism, and democracy • Evolution of imperialism and colonialism • Decolonization • Postcolonialism, independence movements, and emerging nation-states • Establishment of international NGOs • Global response to disasters • Development of international law • Struggle for and recognition of human rights • Social movements and the recognition of individual rights	• Public spaces and monuments that celebrate new nation-states • Public spaces and monuments that express political ideology or national identity • Purpose-built capital cities and administrative centers • Independence monuments and memorials • Sites related to national reunification • Infrastructure developed by new nation-states • Places related to international organizations and groupings • Sites related to natural or human-made disaster • Sites related to human rights abuses • Sites related to social movements • Countercultural sites and settlements

Theme 7 CONSERVING THE NATURAL ENVIRONMENT, BUILDINGS, AND LANDSCAPES

Subthemes	Types of Places
• Development of government conservation legislation and regulations • Growth of civil society conservation organizations • Growth of community advocacy and activism • Conserving natural places • Accelerated pollution and environmental destruction • Conserving cultural heritage • Professionalization of heritage protection • Reconstruction of historic sites • International cooperation in conservation • Broadening of the definition of *heritage* • Sustainable development	• National parks • Nature reserves • Marine reserves • Sites of environmental destruction (natural or human made) • Protected built heritage • Reconstructed historic sites and districts • Adaptively reused older buildings, spaces, structures, and infrastructure • Museums and visitor centers at heritage sites and natural areas • Abandoned sites and ruins • Sites associated with painful memories or social minorities

Theme 8 POPULAR CULTURE AND TOURISM

Subthemes	Types of Places
• Growing access to leisure • Increased participation in individual and competitive sports • Growth of mass sports spectatorship and international sports competition • Production, distribution, and screening of films • Growth in home-based entertainment through TV and radio • Emergence of popular photography • Emergence of amusement and theme parks • Expansion of international expositions • Legalization of gambling • Growth and promotion of tourism • Development of visitor service facilities • Birth of automobile-based travel	• Sporting, recreation, and leisure facilities • Olympic stadiums and sites • Cinemas and theaters • Television and film studios • Television and radio broadcasting facilities • Amusement parks and showgrounds • World's Fair and World Exposition sites • Casinos • Racetracks • Airports, bus depots, and train stations • Lodgings and accommodations • Conference and convention facilities • Restaurants and cafes • Viewing towers and observation decks • Roadside attractions and rest stops

Theme 9 RELIGIOUS, EDUCATIONAL, AND CULTURAL INSTITUTIONS

Subthemes	Types of Places
• Growth and decline of major religions • Impact of theological developments on the organization of worship spaces • Improved literacy and numeracy rates • Increasing role of governments in mass education • Expansion of all levels of public, private, and religious education • Changes in pedagogy • Growth of informal education through museums and libraries • Increased accessibility to museums and libraries • Educational and cultural institutions as expressions of national pride	• Houses of worship, convents, monasteries, shrines, and other sacred sites • Public and private elementary and secondary schools • Public and private colleges and universities • Religious educational institutions • Public playgrounds • Technical schools • Museums • Libraries • Cultural centers

Theme 10 WAR AND ITS AFTERMATH

Subthemes	Types of Places
• Changing nature of warfare • War on a global scale: the two world wars • Expansion of the roles of women and minorities in wartime • Civil wars • Redrawing of national boundaries • Genocide and ethnic and religious cleansing • Forced mass migrations • The Cold War • Revolution and counterrevolution • Decolonization and wars of independence • Growth of terrorism • Memorialization of war and conflict • Postconflict recovery and reconstruction	• Battlefields • Military structures and installations • Missile sites • Sites associated with civilian participation in war efforts • Prisoner-of-war camps and forced-labor camps • Sites of atrocities and trauma • Concentration and extermination camps • Shipwrecks and other submerged wreckage • Nuclear test sites and underground nuclear silos • Civil defense sites • Military cemeteries • Memorials and monuments • Cities, towns, and landscapes reconstructed after being damaged by war

Theme 1

Rapid Urbanization and the Growth of Large Cities

At the start of the twentieth century, seventeen cities in the world each had a population of more than one million. More than half of these cities were in Europe. By 2000, the number had grown to 387, with more than half in Asia.[1] Across the globe, as a result of mass migrations, cities grew rapidly.

Civic authorities, in response to pressing infrastructure needs, worked to make new forms of mass transportation and new energy sources more widely accessible. Worldwide, dramatic changes in the built environment accompanied this urban growth, as cities densified and new forms of living, working, and getting from place to place emerged. Advances in building technologies led to taller structures. Manufacturing expanded in some areas and declined in others, impacting the industrial landscape in each. The new, emerging profession of urban planning delivered new towns and cities, extensive public housing estates, and urban redevelopment proposals that showcased new building techniques and forms, public parks, civic landscapes, and urban design concepts. Many city centers were renewed and revitalized, and in some places suburban sprawl absorbed productive agricultural land. By the end of the century, the positive and negative effects of rapid urbanization became evident in ways that varied in each cultural context.

Mass Migration to Urban Areas

Throughout the world, urban growth in the twentieth century was fueled by migrations, both within and between nations or regions. Initially, the decline in labor-intensive farming brought on by the rise in agricultural mechanization prompted many rural workers to move to nearby towns or cities seeking employment (for more on agricultural mechanization, see theme 3). According to the traditional economic theory of urbanization, as "the modern urban sector (i.e., manufacturing and services) expands, surplus labor from the 'backward' rural economy (i.e., agriculture) is drawn to towns and cities, attracted by higher wages."[2] Economic historians have also pointed to other factors that, throughout the twentieth century, led to more intense urbanization worldwide, with regional and political variations. "Through trade, colonialism, and, in the latter half of the twentieth century, international development

assistance, the key technological and institutional developments that propelled Europe's urban transition were diffused to other regions, stimulating urbanization there as well."[3] Thus, in Africa, South America, and Asia, rapid urbanization became an increasingly dominant process throughout the century, just as it had been—and remained—earlier in Europe and North America.[4]

Larger cities offered more employment options and educational opportunities, as well as such amenities as banking, medical care, and markets, and became a logical destination for those seeking better lives for themselves and their families. Smaller towns and villages were more likely to survive if they remained on a railway network, but line closures in many parts of the world—especially from the 1950s through the 1970s—made it more difficult to move freight and people beyond their immediate locales (for more on the expansion of long-distance transport, see theme 5).[5] As a result, many smaller towns began to decline, though some medium-size communities managed to thrive by capturing regional service functions, providing markets, schools, and other amenities to their residents as well as those in outlying areas.

A second major migration stream in the twentieth century was an external, long-distance mass movement, prompted by strong economic or political incentives for migrants to make longer journeys. In the US, Canada, and Australia, governments offered seemingly unlimited land to tempt domestic migrants in search of greater opportunity and Europeans from agricultural areas who could not afford to buy their own farms. While some were drawn by the prospect of better farming opportunities, other economic migrants chose to settle in the growing cities and pursue employment there.

Before the 1960s, most long-distance migrants arrived by ship. Traveling for weeks in cramped, close quarters created the ideal environment for disease—plague, cholera, typhoid—to flourish. Quarantine stations and migration processing centers were set up at major ports, where new arrivals were strictly separated from the hosting society. Many of these centers, established in the nineteenth century, continued to function well into the twentieth, including North Head Quarantine Station in Sydney, Australia (1830–1984), and Ellis Island in New York, New York (1892–1954); parts of both now function as museums.

The third stream of mass migration comprised refugees—those fleeing conflict, persecution, and privation in their homelands—who sometimes passed through temporary settlements, or refugee camps, before reaching their desired destinations. The Balkan wars, the Russian Revolution, and World War I (WWI) each triggered large-scale migrations in the 1910s and 1920s, including Muslims into Turkey, Greeks from Turkey, and Eastern Europeans from Soviet Russia. Large refugee populations built new communities in many cities, including Jewish refugees in Shanghai (China), which still retains the old Jewish quarter and its synagogues, and in Harbin (China), where the largest Jewish cemetery in East Asia is located.[6] Peak refugee movements in Europe followed the turmoil of World War II (WWII), with many leaving primarily for the US, Canada, Australia, Argentina, and Israel.[7] From the 1950s, the exodus shifted to areas of Africa and Asia, especially where decolonization brought about new ethnic and ideological conflicts (for more on decolonization and ethnic and religious cleansing, see themes 6 and 10, respectively). Many refugees ended up living in camps, supported by international relief agencies; some makeshift camps essentially became permanent settlements. By the end of the century, Afghans were the most numerous at nearly four million displaced, and many found refuge in Pakistan and Iran.[8]

A sense of the pace and geographic variation of the century's urban growth is demonstrated by statistical data from 1950 to 2000. In 1950, 29 percent of the world's population lived in urban areas, with Africa and Asia being the least urbanized. By 2000, that percentage had risen to 47 percent worldwide; in Africa and Asia, the percentage of urban dwellers had more than doubled;[9] and more than half of the world's 387 cities with populations over one million were in Asia.[10] Contributors to the increase included mass migration and better health care in some countries, which had led to a notable decline in infant mortality; other countries—most notably China—had implemented policies to restrict family size. Universally, urban populations grew much more rapidly than rural populations.

Meeting Evolving Infrastructure Needs

Over the course of the twentieth century, cities expanded not only in terms of population but also physically, often in response to changes in land use. These changes are sometimes characterized as urban "sprawl."[11] The influence of urban planning increased significantly as cities attempted to manage and mitigate the effects of rapid growth.

New, expanding cities had to cope with multiple challenges related to nonexistent or outdated infrastructure. Urban residents, regardless of origin, needed services and utilities such as a reliable water supply; indoor plumbing and efficient sewage systems; transportation; energy supply infrastructure, which was sometimes belatedly provided or retrofitted; and wholesale food markets, which increasingly had to be moved to larger or purpose-built structures. Cities also had to accommodate the deceased. As they became denser and as land costs increased, some ran out of land to expand existing cemeteries or build new ones. Construction of crematoria and columbaria became a solution.

Massive waste was being generated by both industry and residents. Early in the century, most cities incinerated their waste or dumped it on land or in water, leading to pollution and public health concerns. Purpose-built garbage incinerators, sometimes architect designed, were to be found in many cities until fears of smoke-borne pollution saw them demolished or reused. By midcentury, many cities moved toward the use of purpose-built sanitary landfills to reduce hazards to health and the environment.[12] As the century advanced, old waste disposal sites were increasingly rehabilitated—sometimes not effectively—and repurposed for such uses as recreation space or housing estates. Recycling grew in popularity, and recycling facilities sprang up in response. While many cities continued to dump most of their rubbish offshore or in nearby rural areas, as containerization brought about cheaper shipping transport, a global trade in waste developed.[13]

Many local and national governments were not able to cope with the challenges of rapid urbanization or effectively provide even the most basic of services. For instance, at the end of the century, hundreds of millions of urban dwellers, primarily in Latin America, Asia, and Africa, still lived in homes and neighborhoods that lacked sanitation systems and safe or adequate water for daily needs.[14]

Delivering Energy: Natural Gas and Electricity

Gas was a key source of energy for growing cities and industries in the nineteenth and twentieth centuries. Coal gas, also known as town gas, was manufactured by burning coal and was delivered

to households and businesses via underground pipes. As late as the 1970s in many places, huge gas storage and distribution facilities, known as gasometers, were among the most visible buildings in the urban landscape.[15] However, the increasing use of natural gas, delivered by pipeline and exported in purpose-built liquid petroleum gas carriers, made coal-fired gas plants and gasometers redundant, and many were repurposed or demolished.[16]

In the early twentieth century, gas was used primarily for heating and lighting. The energy source that made the massive growth of cities possible and revolutionized urban living was electricity. Electrification powered the elevators that made it possible to build skyscrapers and lighted building interiors and urban streets, which allowed longer hours for work and entertainment. It contributed to many innovations that fueled urban growth and transformed people's lives. Among these are mass transit systems, traffic signals, heating and air-conditioning systems, telecommunications, and new office equipment and household appliances; all helped shape cities and the buildings within them. Many central business districts filled with high-rises as cities grew both upward and outward.

Electrification spread through much of the world over the course of the century, though at different times and rates, even within regions. According to the World Bank, at the end of the century nearly 96 percent of the world's urban population had access to electricity, yet in many places, especially in sub-Saharan Africa, urban populations still lacked electricity into the early twenty-first century.[17] Power plants were located near industrial and residential customers until advances in technology enabled them to be moved closer to raw energy sources. Power produced at remote plants was delivered via a power grid comprising transformers, high-voltage transmission lines, substations, and distribution networks. Electricity was produced by burning coal, oil, or natural gas, or through hydroelectric means. New energy technologies emerged in the latter part of the century, including nuclear power and renewable sources such as solar and wind (for more on development of new energy sources, see theme 2). Each of these systems left a legacy of industrial plants, storage facilities, and delivery apparatus on both rural and urban landscapes.

New Forms of Transportation: Mass Transit, the Car, and the Truck

In the late nineteenth and early twentieth centuries, many of the world's largest cities, including London, Tokyo, Paris, Berlin, and New York, began developing mass transit systems—high-capacity public transportation systems in urban areas.[18] These were frequently a combination of aboveground rail lines and underground subways. By the early twentieth century, Melbourne, Milan, San Francisco, and other large cities had developed and were rapidly expanding metropolitan tramways or streetcar systems, either high-cost steel-cabled networks or cheaper, more reliable electrically powered systems.[19] The electrification of streetcars had important ramifications for suburbanization, as streetcar lines began defining new areas ripe for residential and commercial development.[20] The ability to move people efficiently by mass transportation into central business districts and out to more distant suburban, or "garden city," residential developments was a significant catalyst for urban growth.

Urban passenger railways that operated underground or on their own rights-of-way were more efficient than tramways and streetcars that shared roadways with other traffic. Both underground and elevated railways, first installed in some European and American cities in the late nineteenth and early twentieth centuries, were constructed in cities around the world. They allowed ever-growing populations to move across expanding cities and suburban areas—an antidote to the growing congestion from car traffic, which was being compounded by longer journeys to work as people moved farther out from city centers to find affordable housing. Throughout the twentieth century, underground or elevated metro systems were constructed and expanded in countries in Asia, the Middle East, Europe, and the Americas. In some places, they were built by private enterprise, while in others they were built by the state or a public/private consortium.

In the 1920s, motorized buses were introduced (for more on buses, see theme 5).[21] Requiring far less infrastructure than fixed rail, underground, or elevated systems, bus systems offered greater route and scheduling flexibility, were faster to start up, and were more economical to operate. As early streetcar systems aged, many cities in the US, Canada, Ireland, Argentina, Britain, and elsewhere demolished them and turned to this new mode of transport.[22] A few notable tramway systems survived in Europe, with Saint Petersburg's being the largest, while smaller ones lingered in parts of Asia. Melbourne, Australia, is the only city in the English-speaking world to retain its entire tramway system from this era.[23]

Even though the automobile was a late nineteenth-century invention, mass car ownership became a twentieth-century phenomenon. Early in the century, the US led the way in both production and ownership. Manufacturing innovations, including the introduction of the moving assembly line by Ford Motor Company in 1913, development of standardized and interchangeable parts, larger factories, and more efficiently timed factory jobs, boosted production and lowered costs of personal vehicles within, and increasingly beyond, the US.[24]

Cars and, later, trucks began crowding the streets of the world's major cities in the wake of WWI, freeing the movement of people and goods from fixed routes and schedules and furthering the decline of mass transit and railway systems (for more on trucks, see theme 5). This significantly impacted older urban areas whose streets were designed to accommodate earlier forms of transportation. These new vehicles required their own infrastructure—paved roads, gas stations, repair shops, parking, traffic signals and street signage, and car washes—and as their numbers increased, more and more urban space was devoted to them. Such facilities were added to older urban cores but were easier to incorporate into new areas as cities expanded outward.

The dominance of cars and trucks contributed to urban sprawl and pushed the boundaries of cities beyond the reach of mass transit and into new suburban and industrial areas.[25] These newer districts were better able to accommodate growing infrastructural needs with wider roads and more adequate parking and service facilities. After WWII, transportation planners in many places advocated urban freeways as a way to improve circulation. The construction of freeways, however, almost always required the acquisition and demolition of hundreds of buildings and changed entire city landscapes, destroying older neighborhoods and communities.

Changing Conditions in Industrial Cities and Zones

The migration to cities was largely propelled by a search for jobs, many of which were in manufacturing. Early in the twentieth century, most factories were located either in urban areas or in industrial cities that had sprouted up around manufacturing. This led to the birth of the industrial estate, or industrial park, an area on the edge of a city designed for factories. One of the first, at Trafford Park in Manchester, England, housed a large number of manufacturers employing tens of thousands of people.[26] Before WWII, most industrial parks had rail links. After midcentury, trucks enabled industrial operations to move farther out of city centers to larger sites on the periphery. Factories that once operated in multi-story urban buildings moved to peri-urban areas where they could reconfigure their operations on a single floor for greater efficiency. For example, breweries, along with bulk distribution and warehouse operators, built distribution centers in the outer suburbs or in previously undeveloped (greenfield) sites abutting new freeways. Older industrial buildings, now vacant, were subject to demolition or adaptive reuse. Later in the century, the adaptability and affordability of cars and trucks also complemented the creation of suburban industrial parks and decentralized employment nodes, where vast parking lots accommodated workers commuting by car.[27]

Much as industrialization occurred at different rates and times in different places, so, too, did deindustrialization. It intensified in many countries in Europe, as well as in the US and Japan, during the last three decades of the twentieth century. Jobs in manufacturing as a share of total employment fell in these countries, primarily as a result of higher productivity, while the share of employment in services rose.[28] At the same time, manufacturers began shifting production to places where wages were lower and safety and environmental standards less stringent.

As manufacturing plants closed, many industrial cities entered a state of decline. The expression "Rust Belt" originated in the early 1980s to describe the heavily industrialized midwestern and northeastern regions of the US that were increasingly marked by abandoned factories and waning populations.[29] Other places with declining industrial economies, such as the Ruhr region of Germany and Dongbei in northeastern China, experienced their own versions of the Rust Belt. Single-industry towns and cities were particularly hard hit. After 1991, restructuring the industries of such monotowns was especially challenging in the former USSR.[30] In larger cities, it was easier to diversify industrial bases and expand service industries at the same time. Abandoned buildings have become a common sight in former industrial towns, as seen in the railway sidings or wharves that once serviced them.

Following WWII, as some countries were beginning the process of deindustrialization, a number of colonies or republics—including Hong Kong, Singapore, Taiwan, and South Korea—were launching their own successful industrial revolutions.[31] After 1978, the People's Republic of China underwent a series of reforms that fostered industrial growth, eased restrictions on the mobility of people and goods, and created special economic zones that were open to foreign investment, first in small coastal cities and later in larger, older cities.[32] Within two decades, China had become a global industrial power. These countries, and many others around the world that expanded their manufacturing sectors in the latter part of the twentieth century, experienced a migration of workers to these new industrial centers. New infrastructure was created, and built environments were altered to accommodate these new inhabitants and industries.

New Forms of Urban Living

The form and scale of any city depends on many factors, including topographic setting, rate of population growth, mix of manufacturing and retailing, the political system under which it is governed, cultural norms, the town or city planning measures enacted (though these are not always enforced), and the main modes of housing that building materials and household income allowed.

Suburbanization was a major twentieth-century trend in residential and community development. It unfolded at different times in different parts of the world and took varied forms. For example, suburbanization took hold early in North America and Australia, where undeveloped land close to existing cities was relatively abundant. Beginning in the nineteenth century, developers profited from building low-density suburban neighborhoods filled with detached single-family houses and conveniently located shops for household supplies. Most residents commuted to jobs in the nearby city. First located along streetcar lines, the suburbanization trend accelerated in the automobile age, expanding greatly in the second half of the century. As suburbs grew increasingly automobile dependent, new types of parking-oriented shopping centers were built.

Around the same time, older European and Asian cities with relatively high densities and a tradition of two- to six-story housing structures continued building in that mode, with both freestanding and attached houses located farther out of town. In these places, larger-scale suburbanization did not come about until the second half of the century, often in connection with increased affluence.[33] Yet, in cities such as Paris, France, large-scale housing developments occupied primarily by the poor, the working class, and immigrants were also built in suburban rings beyond the urban core.

The new town planning movement emerged in the UK during the immediate post-WWII years. Designed to relocate populations away from urban areas into previously undeveloped areas, new towns differed from suburbs in that they were conceived as relatively autonomous communities. These planned cities arose in other places as well, including France, Germany, Italy, Sweden, and North America.

African cities developed in a variety of political and economic directions, particularly in the 1960s following independence from European colonial regimes. The racial disparities inherent in the colonial system persisted in African cities, as evidenced by the quality of urban housing. For example, under South Africa's apartheid regime, wealthier whites lived in gated estates, while much of the Black population was relegated to substandard housing in peripheral townships. The country continued to struggle with the effects of segregation after the fall of apartheid in 1994.[34]

In Asia, particularly by the 1970s, intense migration from rural to urban settlements often occurred because of industrialization. Many Asian cities also sponsored megaprojects such as new town developments, commercial and technology hubs, high-rise commercial centers, and large infrastructural undertakings such as airports and container ports. Chinese urbanization was especially intense following the economic reforms of the late 1970s.[35]

After both world wars, Europe was in dire need of new housing to replace what had been destroyed. This provided the catalyst for several significant changes that had worldwide implications. For example, the creation of the Bauhaus in Germany in 1919 and the Weissenhof Housing Exhibition in Stuttgart, Germany, in 1927 galvanized a completely new concept of housing as—in the words of Swiss-born

French architect Le Corbusier, one of the modern movement's primary contributors—a "machine for living." On the heels of WWII in particular, the provision of social housing (government- or non-profit-owned housing for people with low incomes) in countries including England, Italy, and France was in part inspired by precedents for innovative mass housing design in places like Sweden and the Netherlands.[36] Post-WWII redevelopment in many downtown areas was denser than what had been destroyed, with the construction of taller apartments and mixed-use buildings.

In some capitalist cities where income inequalities prevailed, once-wealthy neighborhoods of large, older houses were demolished to make way for higher densities (discussed in the next section). Many inner cities also had nineteenth-century workers' housing that saw high tenant turnover and suffered from deferred maintenance. Beginning during WWI, rent control was introduced as a means of ensuring housing affordability in major cities in the UK, Australia, the US, and elsewhere. Such regulations were enacted and repealed in different places at different times throughout the century, sometimes with unintended consequences: with their profits controlled by law, property owners had little incentive to maintain their properties, leading to deterioration of housing stock and living conditions. By the time of the Great Depression in the 1930s, even the new large cities had slums representing various degrees of building decay and poverty. Some dwellings were demolished, while those that survived both the Depression and wartime damage were often either classed as slum areas for wholesale clearance or gentrified as the middle class returned to some inner cities.

After the Russian Revolution of 1917, socialist cities of the USSR experienced a period of intense urbanization, resulting in the drastic need for more rationalized (and noncapitalist) town planning. This included the designation of microdistricts (*microrayon*), in which housing blocks were clustered in proximity to public service buildings. The production and provision of housing was considered a state-controlled need. During the Cold War, the USSR erected hundreds of standardized, mid-rise housing units without elevators, sometimes called *khrushchyovka*. As other countries came under the sway of Soviet rule, they, too, erected versions of both *microrayon* and *khrushchyovka*.[37] The People's Republic of China followed suit, especially between 1953 and 1960, when Soviet models of urbanization were adapted by Mao Zedong, China's leader from 1949 to 1976.[38] In the Mao era, housing came second to industrial investment but in the 1980s and 1990s received a larger share of government investment.[39]

High-rise apartments, common in some European and American cities by the interwar years, became the main mode of residential building in a number of congested cities in Asia from the 1960s, including Hong Kong, Singapore, and many in Japan. Similar trends were also seen during this period in South American cities such as Buenos Aires, Caracas, and São Paulo, as European and North American architects began to publish and practice internationally. Cities around the world experienced increasing population density over the course of the century.

In many societies, construction of the first high-rise apartments was funded by governments and later by private consortia. Opulent units were aimed at wealthy owner-occupiers, but the majority of apartments were rentals and not luxurious. However, in other capitalist cities there was a critical shortage of affordable housing, contributing to the rise of shantytowns and slums. In hot and humid climates throughout much of Asia, Africa, and South America, the sleek external walls of architect-designed buildings became marred by the installation of air-conditioning units. By the end of the twentieth century, landowners, investors, and developers made most of the decisions about new housing, except in places where state- or community-owned agencies remained the major providers.

Renewing and Redeveloping the Inner City and Urban Core

The history of a city may be partly understood by studying its buildings and public spaces. In the twentieth century, many older city centers were rebuilt, renewed, or redeveloped for a variety of reasons, including recovery following a war or natural disaster; replacement of older and decaying building stock; in response to changing sociological or economic conditions; and changes in land use.

A number of twentieth-century disasters, both natural and human made, resulted in the nearly instantaneous destruction of countless urban places, leading to massive redevelopment and renewal efforts, particularly in Europe and Asia in the wake of the two world wars. Many factors determined how cities approached disaster recovery. Some, such as Le Havre, France, took the opportunity to modernize and make general improvements in urban design. Leveled by bombs in 1944, this port city was rebuilt between 1946 and 1964 and is an outstanding example of postwar urban planning and architecture. Warsaw, Poland, took the opposite approach, carefully reconstructing its historic center, which was largely destroyed in 1944 (for more on postconflict reconstruction, see theme 10). In cases of natural disaster, some cities sought to mitigate hazards as they rebuilt. Following the 1995 earthquake in Kobe, Japan, the city moved forward with seismic-resistant structures.[40] Other cities took the opportunity to restore something previously lost. After the 1989 Loma Prieta earthquake in California damaged San Francisco's Embarcadero Freeway—an elevated roadway that had cut the waterfront off from the city itself—the freeway was demolished and the waterfront redeveloped.[41] Whatever the approach, disaster response was costly and complicated. Without adequate resources to conduct recovery operations, war and natural disaster took a more enduring toll on poorer countries.

Over the course of the twentieth century, property developers and governments looked to improve inner-city landscapes. In some cases, government decision makers approved large-scale demolitions in the name of "urban renewal," which (in North America and Europe, particularly) was a euphemism for the wholesale demolition of unprotected, poor, and vulnerable residential neighborhoods.[42] Such clearances may have removed the blighted urban fabric but destroyed social relationships and cohesive community networks in the process. Some neighborhoods were replaced by new housing developments, either affordable or market rate, whereas other areas underwent a complete change of use. After midcentury, many new government, civic, or cultural centers were constructed on the cleared sites of vibrant older neighborhoods. A number of these were extensively landscaped and incorporated public spaces. Often controversial, urban renewal programs sought to remake cities along modern lines through rational city planning. By century's end, many of these places had themselves become targets of redevelopment or the focus of preservation efforts.

Changes in political or socioeconomic conditions often paved the way for redevelopment or renewal. After the demise of the Soviet Union in 1989, when Eastern European countries were cut loose from the Soviet bloc and capitalist investments were permitted, city centers that had languished due to poor maintenance under the socialist regime became incentivized targets for investment, as witnessed in Budapest, Hungary, and the former East Berlin in Germany, as well as in Riga, Latvia, and Tallinn, Estonia.[43]

At various times and in different places, property owners and developers eyed city centers—with their excellent public transport infrastructure and access to a variety of jobs—as potentially profitable places ripe for redevelopment. This frequently involved rehabilitating older buildings and bringing new development to existing neighborhoods rather than wholesale changes of use. As such neighborhoods gentrified, however, longtime residents were priced out of new apartment blocks or restored terrace houses.

In almost all cities, remnants of an earlier past persisted, from railway networks to road patterns that remained virtually unchanged for centuries. Even in the world's largest cities—from Cairo, Egypt, to Tokyo, Japan—small urban precincts have been conserved, retaining their scale and purpose. By century's end, less populous cities and towns, especially those with static or falling populations, were attracting new communities who might work remotely or in collectives, challenging the rural/urban drift.

Photo Gallery

The table below lists a selection of subthemes and types of places related to theme 1 and is excerpted from "Twentieth-Century Themes, Subthemes, and the Places That Exemplify Them" (see pp. 10–15). It is followed by a gallery of photos showing a diverse range of buildings, sites, structures, and landscapes from around the world that exemplify the issues and subthemes discussed. The text accompanying each photo explains how that place represents the theme of the preceding essay. Some of these places may already be listed as heritage places (from local inventories to the World Heritage List) while others are not, though they *may* be identified as significant in the future. Some are specifically mentioned in the text; many are not. All are included here as exemplars to prompt broad exploration of potential heritage places.

Theme 1 RAPID URBANIZATION AND THE GROWTH OF LARGE CITIES

Subthemes	Types of Places
• Mass population migration to urban areas and decline of smaller towns • Increasing city size, population, and density • Increasing scale and range of infrastructure needs • Introduction of new energy sources • Improvements in mass transit • The influence of the car and the truck • Expansion and contraction of industrial cities and zones • Defining new forms of urban living: densification and suburbanization • Redeveloping and renewing inner cities	• Refugee camps • Water and sewage systems • Crematoria, mausoleums, and cemeteries • Waste management and recycling facilities • Power plants and infrastructure • High-rise buildings and skyscrapers • Urban mass transit stations and infrastructure • Automobile- and truck-related infrastructure and services • Factories and industrial zones • Suburbs • Shopping centers • New towns and planned cities • Social housing and housing estates • Shantytowns • Civic landscapes and public parks

Figure 1.1. Kuwait Towers (Abraj Al-Kuwait), 1965–77, Kuwait City, Kuwait. These three concrete towers, by Danish designer Malene Bjørn and constructed by Swedish architectural and engineering firm VBB (now Sweco), are a key component of the water storage and distribution system that enabled the urban transformation of modern Kuwait. Covered with enameled metal discs and evocative of Islamic minarets, one tower exclusively stores water, another incorporates a public viewing platform and restaurant, and the third supports a floodlighting system.
Photo: 2017, ©Sheridan Burke.

Figure 1.2. Woodland Crematorium, Woodland Cemetery (Skogskyrkogården), 1937–40, Stockholm, Sweden. Construction of Woodland Cemetery commenced in 1920 in response to the growing city's need for additional cemetery space. Swedish architects Gunnar Asplund and Sigurd Lewerentz based their vision on the underlying landscape, blending nature and architecture. The crematorium, designed by Asplund, was one of the last structures integrated into the original landscape design. With its varied, parklike grounds, Woodland Cemetery profoundly influenced cemetery design throughout the world and was inscribed on the World Heritage List in 1994.
Photo: 2005, Håkan Svensson Xauxa, courtesy Wikimedia Commons, CC BY 3.0.

Figure 1.3. Willoughby Incinerator, 1934, Willoughby, Australia. One of thirteen municipal incinerators designed by American architect Walter Burley Griffin and his Australian partner Eric M. Nicholls for various Australian cities, the Willoughby Incinerator processed garbage and waste using a patented system. In response to the increasing need for safe and efficient waste management in this burgeoning suburb of Sydney, Griffin gave the community a proud civic building rather than an industrial eyesore. The incinerator remained in use until 1967, when pollution concerns closed its operations. It was adapted for other uses in the late 1970s. Badly damaged in a 1996 fire, it was conserved and reopened in 2011 as a community art space and cafe, complete with reconstructed chimney.

Photo: 2011, ©Sheridan Burke.

Figure 1.4. Empire State Building, 1928–31, New York, New York, USA. A global icon in the history of skyscrapers, the Empire State Building, designed by the US architectural firm of Shreve, Lamb, and Harmon, was the world's tallest building from 1931 to 1972. It epitomized the erection of landmark corporate skyscrapers and the densification of central business districts in many rapidly growing cities in the US, Europe, and elsewhere between the world wars. The building, with its stepped-back massing, followed the requirements of new zoning laws (in New York's case, after 1916), reflecting the significance of the urban-planning profession in the early twentieth century.

Photo: 2012, Sam Valadi, courtesy Wikimedia Commons, CC BY-2.0.

Figure 1.5. Mayakovskaya Metro Station, 1938, Moscow, Russia. The Moscow Metro, opened in 1935, was the first underground railway system in the Soviet Union. Mayakovskaya Station, in central Moscow, is considered to be one of the most beautiful in the city. Designed by Soviet architect Alexey Dushkin and named for prominent futurist poet Vladimir Mayakovsky, it is a fine example of pre-WWII Stalinist architecture and is best known for its cycle of thirty-four ceiling mosaics called "24-Hour Soviet Sky."

Photo: 2015, FritzDaCat, courtesy Wikimedia Commons, CC BY-SA 4.0.

Figure 1.6. Praça Tiradentes bus stop, Curitiba Integrated Transport Network (RIT), ca. 1990s, Curitiba, Brazil. As the population of Curitiba began expanding rapidly in the 1970s, the city devised a bus rapid transit system that incorporated the functional advantages of light rail with the cost advantages of buses. RIT buses traveled in dedicated lanes, with stations along medians. As ridership increased, the system instituted elevated tube-like bus stations on elevated platforms where fares were collected before boarding to allow for quicker entry and departure. The RIT system is the most widely used form of transportation in Curitiba and has served as a model for other cities.

Photo: 2013, Pulsar Imagens / Alamy Stock Photo.

Figure 1.7. Freeway interchange, 1980s, Gardena, California, USA. This interchange facilitates transitions between the 110 and 91 freeways south of downtown Los Angeles. It is part of Southern California's vast freeway network and reflects the dominant role of the automobile in many cities after WWII. With a booming, car-dependent population in the postwar years, Los Angeles developed a freeway system master plan in 1947; construction began in the 1950s. The freeways led to further urban sprawl with the development of new retail nodes and residential subdivisions.

Photo: Beglib, 2003, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 1.8. Levittown suburban housing development, 1947, Long Island, New York, USA. Levittown was one of the largest and among the first mass-produced suburbs in post-WWII America. Its developers perfected a system of quickly assembling houses using standardized materials and workers trained to perform a single task. Built on 4,000 acres (1,619 hectares) of former potato fields located some 35 miles (56 kilometers) east of Manhattan, it was a community of seventeen thousand uniform single-family houses situated on curving streets along with schools, swimming pools, playgrounds, and a shopping center. As in many other suburban developments in the US, the use of restrictive covenants and mortgage lending practices limited homeownership to white families. The majority of Levittown's men commuted to jobs in the city, providing a model for countless other suburban communities in the US.
Photo: ca. 1948, Ewing Galloway, Alamy Stock Photo.

Figure 1.9. Petronas Twin Towers, 1994–96, Kuala Lumpur, Malaysia. Designed by US (Argentine-born) architect Cesar Pelli, the towers were commissioned by Malaysia's national petroleum company, Petronas, as its official headquarters. Renowned as the tallest buildings in the world from 1998 to 2004, the towers became iconic symbols of Malaysia's economic prosperity and Kuala Lumpur's newfound identity as a major urban hub. The concrete-framed and steel- and glass-faced structures reflect the growing trend within several East Asian urban contexts near the end of the century for megaprojects that became nodes for employment, retail expansion, and tourism.
Photo: David Davies, 2012, courtesy Flickr, CC BY-SA-2.0.

Figure 1.10. Carl Legien Housing Estate (Wohnstadt Carl Legien), 1928–30, Berlin, Germany. This estate, comprising more than eleven hundred housing units, was built by GEHAG, a public cooperative established to meet the urgent needs for middle-class housing during the Weimar Republic following WWI. Designed by Bruno Taut and Franz Hillinger (German- and Romanian-born, respectively), this complex exemplifies the adoption of modernist architecture for housing by European social reformers and architects between the world wars. This is one of six Berlin housing estates inscribed on the World Heritage List in 2008.

Photo: 2009, Doris Antony, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 1.11. Barbican Estate, 1965–76, London, England. A noteworthy example of postwar urban planning by the British architectural firm of Chamberlin, Powell, and Bon, the Barbican Estate in central London is remarkable for its scale and complexity and demonstrates the ambitiousness of redevelopment projects from this era. Commissioned by the London Council, it introduced a new, modernist urban form on a fourteen-hectare (forty-acre) WWII bomb site. Elevated above the streets on a podium, this seven-story concrete structure of more than two thousand flats features a lake, gardens, and public courtyards as well as amenities such as a theater, library, and school.

Photo: 2012, Suttonpubcrawl, courtesy Wikimedia Commons, CC BY-3.0.

Figure 1.12. Nakagin Capsule Tower, 1970–72, Tokyo, Japan. This mixed-use office and residential tower is a cluster of 140 prefabricated concrete modules stacked around a central service core. It was designed by architect Kisho Kurokawa, who was born in Nagoya, to house Japanese businessmen who worked in congested Tokyo and did not wish to commute daily to and from their family homes. Its distinctive modular units, analogous to the cells of a plant, made it an icon of Metabolism. This movement, embraced by Kurokawa and other Japanese architects beginning in the early 1960s, likened cities and buildings to ever-changing, organic living beings.

Photo: 2015, Kisho Kurokawa, courtesy Flickr, CC BY-2.0.

Figure 1.13. Soweto shantytown, mid- to late twentieth century, Johannesburg, South Africa. Officially named in 1963, Soweto (an acronym for South West Townships) grew from a collection of Black townships that developed in the early twentieth century as the white South African government began separating people by race. As more Blacks migrated to Johannesburg in search of work, Soweto's growth was rapid and haphazard. While some of its residents lived in affluence, many suffered from poor housing, unemployment, and lack of infrastructure. Settlements of makeshift corrugated metal shacks such as these became part of Soweto's landscape.

Photo: 2005, Matt-80, courtesy Wikimedia Commons, CC BY-2.0.

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Figure 1.14. Sirius Building, 1978–79, Sydney, Australia. Located in the historic area of Sydney known as The Rocks, the Sirius apartment complex was built to provide housing for working-class residents displaced by urban redevelopment. Designed by Dutch-born Tao Gofers of the Office of the Government Architect, New South Wales, the project was the result of an agreement put in place to end a green ban, a celebrated and unique tool of civic conservation action that started in Australia in the 1970s. Under a green ban, builder's unions would withdraw their labor from redevelopment sites to help local communities save historic precincts, working-class housing, and green space. This movement eventually halted the wholesale redevelopment of the area and led to the introduction of heritage legislation.

Photo: 2015, ©Sheridan Burke.

NOTES

1. David Satterthwaite, "The Scale of Urban Change Worldwide 1950–2000 and Its Underpinnings," Human Settlements Working Papers Series, Urban Change, no. 1 (London: International Institute for Environment and Development, 2005), 7, table 3, https://pubs.iied.org/9531IIED.
2. Sean Fox, "Urbanization as a Global Historical Process: Theory and Evidence from Sub-Saharan Africa," *Population and Development Review* 38, no. 2 (June 2012): 287.
3. Fox, 293.
4. Hannah Ritchie and Max Roser, "Urbanization over the Past 500 Years," Our World in Data, last modified November 2019, https://ourworldindata.org/grapher/urbanization-last-500-years; Arturo Almandoz Marte, "Latin America's Urbanization in the 20th Century," Oxford Bibliographies, last modified May 24, 2017, https://doi.org/10.1093/obo/9780199766581-0187; and United Nations for Human Settlements, *An Urbanizing World: Global Report on Human Settlements, 1996* (Oxford: Oxford University Press for the United Nations Centre for Human Settlements [HABITAT], 1996).
5. See Christian Wolmar, *Blood, Iron, and Gold: How the Railroads Transformed the World* (New York: PublicAffairs, 2010), 306–17.
6. Irena Vladimirsky, "The Jews of Harbin, China," Museum of the Jewish People—Beit Hatfutsot, accessed March 4, 2020, https://www.bh.org.il/jews-harbin/; and Ernest G. Heppner, *Shanghai Refuge: A Memoir of the World War II Jewish Ghetto* (Lincoln: University of Nebraska Press, 1993).
7. Dudley Kirk and Earl Huyck, "Overseas Migration from Europe since World War II," *American Sociological Review* 19, no. 4 (August 1954): 447–52.
8. Richard Overy, *Collins Atlas of 20th Century History* (London: Collins, 2005), 168–69.
9. Satterthwaite, "Scale of Urban Change," 3, table 2.
10. Satterthwaite, 7, table 3.
11. Robert Bruegmann, *Sprawl: A Compact History* (Chicago: University of Chicago Press, 2005).
12. *Encyclopedia Britannica*, s.v. "Solid-waste Management," by Jerry A. Nathanson, last modified July 30, 2019, https://www.britannica.com/technology/solid-waste-management.
13. See also John Pichtel, *Waste Management Practices: Municipal, Hazardous, and Industrial* (Boca Raton, FL: Taylor & Francis, 2005).
14. Satterthwaite, "Scale of Urban Change," 26–27.
15. Ed Ram, "Will the UK's Gas Holders Be Missed?," *BBC News*, February 9, 2015, https://www.bbc.com/news/magazine-30405066.
16. Tim Miser, "A Short History of the Evolving Uses of Natural Gas," *Power Engineering* 119, no. 2 (February 13, 2015), https://www.power-eng.com/2015/02/13/a-short-history-of-the-evolving-uses-of-natural-gas/.
17. "Access to Electricity, Urban (% of Urban Population)," World Bank Open Data, accessed March 4, 2020, https://data.worldbank.org/indicator/EG.ELC.ACCS.UR.ZS?end=2017&start=1990; and Hannah Ritchie and Max Roser, "Share of Rural vs. Urban Population with Electricity Access, 2016," Our World in Data, last modified November 2019, https://ourworldindata.org/grapher/share-of-rural-population-with-electricity-access-vs-share-of-total-population-with-electricity-access.
18. Definition from Stephen Marshall, "Mass Transit," in *Encyclopedia of the City*, ed. Roger W. Caves (Abingdon, UK: Routledge, 2005), 305–6.
19. Robert C. Post, *Urban Mass Transit: The Life Story of a Technology* (Baltimore: Johns Hopkins University Press, 2010); and H. C. P. Havers, *Underground Railways of the World: Their History and Development* (London: Temple Press Books, 1966).
20. Kenneth T. Jackson, *Crabgrass Frontier: The Suburbanization of the United States* (New York: Oxford University Press, 1985).
21. *Encyclopedia Britannica*, s.v. "Mass Transit," by Joseph L. Schofer, last modified April 25, 2017, https://www.britannica.com/topic/mass-transit.
22. Winfried Wolf, *Car Mania: A Critical History of Transport, 1770–1990* (London: Pluto Press, 1996), 154; Glenn Yago, *The Decline of Transit: Urban Transportation in German and U.S. Cities, 1900–1970* (Cambridge: Cambridge University Press, 1984); and Wolmar, *Blood, Iron, and Gold*, 287.
23. Peter Spearritt, "Why Melbourne Kept Its Trams," in *UHPH_14: Landscapes and Ecologies of Urban and Planning History. Proceedings of the 12th Australasian Urban History Planning History Conference*, ed. Morten Gjerde and Emina Petrović (Wellington, NZ: Australasian Urban History / Planning History Group and Victoria University of Wellington, 2014), 771, 779, https://www.wgtn.ac.nz/wfadi/pdf/Proceedings.pdf#page=771; and Post, *Urban Mass Transit*, 114–16.

24. Jean-Pierre Bardou et al., *The Automobile Revolution: The Impact of an Industry* (Chapel Hill: University of North Carolina Press, 1982), 59–76. See also Alfred D. Chandler Jr., ed., *Giant Enterprise: Ford, General Motors, and the Automobile Industry* (New York: Harcourt, Brace & World, 1964).

25. Martin V. Melosi, "The Automobile Shapes the City," Automobile in American Life and Society, accessed March 4, 2020, http://www.autolife.umd.umich.edu/Environment/E_Casestudy/E_casestudy1.htm.

26. Alec Herron, "Manchester's Trafford Park, the World's First Industrial Estate—A History of Cities in 50 Buildings, Day 26," *The Guardian*, April 29, 2015, https://www.theguardian.com/cities/2015/apr/29/manchester-trafford-park-world-first-industrial-estate-history-cities-50-buildings.

27. J. R. Bale, "Towards a Definition of the Industrial Estate: A Note on a Neglected Aspect of Urban Geography," *Geography* 59, no. 1 (January 1974): 31–34.

28. Robert Rowthorn and Ramana Ramaswamy, *Deindustrialization: Its Causes and Implications*, Economic Issues 10 (Washington, DC: International Monetary Fund, 1997), 1–3, https://www.imf.org/EXTERNAL/PUBS/FT/ISSUES10/INDEX.HTM.

29. Philip Cooke, ed., *The Rise of the Rustbelt* (London: UCL Press, 1995).

30. World Bank, *Russian Economic Report No. 22* (Washington, DC: World Bank, 2010), http://documents.worldbank.org/curated/en/974021468092953100/Russian-economic-report.

31. Steven J. Ericson, "The Industrial Revolution in the Twentieth Century, with a Focus on Japan and the East Asian Followers," *OAH Magazine of History* 15, no. 1 (Fall 2000): 24.

32. *Encyclopedia Britannica*, s.v. "Special Economic Zone," last modified September 20, 2019, https://www.britannica.com/topic/special-economic-zone; and Loren Brandt, Debin Ma, and Thomas Rawski, *Industrialization in China*, IZA Discussion Papers Series no. 10096 (Bonn: IZA Institute of Labor Economics), https://www.iza.org/publications/dp/10096/industrialization-in-china.

33. Bruegmann, *Sprawl*; and Wendell Cox, "Dispersion in Europe's Cities," *NewGeography* (blog), April 17, 2015, http://www.newgeography.com/content/004901-dispersion-europes-cities.

34. Oliver Wainwright, "Apartheid Ended 20 Years Ago, So Why Is Cape Town Still 'a Paradise for the Few'?," *The Guardian*, April 30, 2014, https://www.theguardian.com/cities/2014/apr/30/cape-town-apartheid-ended-still-paradise-few-south-africa.

35. Yue-man Yeung, "Rethinking Asian Cities and Urbanization: Four Transformations in Four Decades," *Asian Geographer* 28, no. 1 (2011): 65–83.

36. Richard Pommer and Christian F. Otto, *Weissenhof 1927 and the Modern Movement in Architecture* (Chicago: University of Chicago Press, 1991); and Kathleen Scanlon, Melissa Fernández Arrigoitia, and Christine Whitehead, "Social Housing in Europe," *European Policy Analysis* 17 (2015): 1–12, http://www.sieps.se/en/publications/2015/social-housing-in-europe-201517epa/.

37. Kimberly Elman Zarecor, *Manufacturing a Socialist Modernity: Housing in Czechoslovakia, 1945–1960* (Pittsburgh: University of Pittsburgh Press, 2011); and Kuba Snopek, *Belyayevo Forever: A Soviet Microrayon on Its Way to the UNESCO List* (Berlin: Dom Publishers; Moscow: Strelka Institute, 2015).

38. K. Sizheng Fan, "A Classicist Architecture for Utopia: The Soviet Contacts," in *Chinese Architecture and the Beaux-Arts*, ed. Jeffrey W. Cody, Nancy S. Steinhardt, and Tony Atkin (Honolulu: University of Hawai'i Press, 2011), 91–126.

39. Lü Junhua, Peter G. Rowe, and Zhang Jie, eds., *Modern Urban Housing in China, 1840–2000* (Munich: Prestel, 2001).

40. Linda Poon, "To Bounce Back from Disaster, Balance Is Key," *CityLab*, July 21, 2017, https://www.citylab.com/environment/2017/07/bouncing-back-from-natural-disasters-is-all-about-balance/534354/.

41. Liz Farmer, "3 Cities That Used Natural Disasters to Revitalize Their Futures," *Governing: The Future of States and Localities* (blog), August 2013, https://www.governing.com/topics/transportation-infrastructure/gov-cities-that-used-disasters-to-revitalize-their-futures.html.

42. Christopher Klemek, *The Transatlantic Collapse of Urban Renewal: Postwar Urbanism from New York to Berlin* (Chicago: University of Chicago Press, 2011).

43. Alain Bertaud and Bertrand Renaud, "Socialist Cities without Land Markets," *Journal of Urban Economics* 41, no. 1 (January 1997): 137–51.

Theme 2

Accelerated Scientific and Technological Development

Changes brought on by advances in scientific research and development accelerated dramatically over the course of the twentieth century. As the century dawned, humankind had just begun to explore Antarctica; by its end, we had reached outer space.

A multitude of scientific and technological developments unfolded that had marked effects on life and cultural landscapes worldwide. These include more efficient means of manufacturing and transporting energy and the rise of clean energy technology. The increasingly widespread use of new types of building materials and prefabrication in construction, combined with advances in structural engineering, transformed the built environment. Improvements in public health and medicine dramatically impacted population growth, human longevity, and quality of life. Scientific research cultivated a better understanding of the molecular world and quantum physics. Furthermore, the link between scientific research and the development of products and services led to a boom in research and development (R&D) operations and facilities. Many technologies developed for the military were later adapted for peacetime civilian purposes. The apex of such research led to space exploration, a distinctively twentieth-century innovation.

The Scope, Pace, and Scale of Scientific Change

Many of the scientific and technological innovations that came to typify the twentieth century had their origins in the nineteenth century or earlier. They include the use of steam power, electricity, telephones, and radio; the invention of photography, steel production, and other engineered materials such as Portland cement; and discoveries from the microscopic level to the astronomical level.

The key difference in the innovations of the twentieth century as compared to those of earlier eras, however, lies in their *acceleration* as well as their large-scale and pervasive effects. These developments had an impact—for good and ill—across the world, occurring in diverse forms and at different times within disparate regions. Rapid publication and dissemination of scientific findings would go

on to help create cultural landscapes—or greatly alter them. Television, computer technology, and the internet were among the new communications technologies introduced (for more on mass communications and digital technology, see theme 5). These burgeoning innovations contributed to the advent of globalization (for further discussion, see theme 4); they also exacerbated global conflict (for more on the changing nature of warfare, see theme 10).

To accommodate the accelerated growth and the profound advances being made, many facilities had to be altered or built anew. Scientific research brought about continual changes in medical treatments, disease control, and health technologies, which affected the design and location of hospitals and medical facilities. Other building complexes such as factories were also altered and adapted to accommodate new technologies. More and more frequently, new buildings replaced older ones, and sometimes even were themselves abandoned as further changes in technology or market demand rendered them obsolete. For example, small, labor-intensive industries, such as ceramics factories in countries from Portugal to Japan, were replaced by ever-larger producers upgraded with automated glazing and firing systems.

Advances in science and technology are not made in a linear manner, like the inevitable "march of progress"; instead, they reflect the time lag between an invention and its commercial application, or its manifestation in buildings and landscapes, which can take many decades. There was a great disparity in how rapidly these advances permeated all regions of the world. For instance, the initial use of solar energy to produce electricity dates to the late nineteenth century with the development of the solar cell, but significant improvements in efficiency did not occur until the 1960s, and commercial viability came later with reductions in production costs.[1] In Germany, Italy, and other industrialized countries, consumers widely accepted the new technology, as evidenced by the many rooftop solar panels installed by the end of the century.[2] Other places, such as many countries in Africa, were unable to adopt the technology as extensively.[3]

Given these regional disparities, the landscape-related impacts of new scientific inventions or machine technologies varied. Bicycles swept the world in the last decades of the nineteenth century and in the early twentieth century, providing improved mobility but requiring little infrastructure. Cars and trucks, powered by internal combustion engines and introduced late in the nineteenth century, had a far greater effect on landscapes, especially as automobile use became more common in the twentieth century. Motorized vehicles occupied more space than earlier forms of transport. Roads and their related infrastructure, such as bridges and car parks, were prominent landscape markers of the advances in science and technology.

Diversification of the Manufacture and Transport of Energy

The use of electricity and petroleum in a multitude of applications had significant and widespread effects on the built environment. Electricity, which was in its infancy in 1900, subsequently spread to most parts of the world and, like advances in science and technology, did so at different rates and times even within industrialized countries. This left a legacy of structures on the landscape, including transmission pylons, power stations, and overhead, underground, and undersea cables.

Larger, more efficient means of producing and conveying electricity were also developed. Early in the century, coal-fueled power plants were usually located near large cities, which were the major consumers; the coal was brought in by ship or rail. The great power stations of the first half of the twentieth century were vast industrial undertakings. From the late 1950s, high-speed transmission wires made it possible to send electricity over longer distances, and many power stations moved from populated urban areas to locations closer to coal fields.

Coal remained a major energy source. In the year 2000, about 39 percent of the world's electricity was generated from this resource.[4] Because of the exponential increase in demand, even coal-rich nations such as India and China continued to import coal.[5] Developing nations relied on political and/or economic allies to finance and build such infrastructure. Power stations in Vietnam, for instance, were erected first by the Soviet Union and later by the People's Republic of China as Communist Party political allegiances shifted.

Oil refineries and gas power plants also appeared in many locations around the world. The ability not only to tap into natural underground gas supplies but also to export it as liquid gas in bulk carriers meant that by the 1990s more industries could use natural gas as a source of power. Consumer households used it for heating and cooking, frequently in the form of tanks of compressed liquified petroleum gas and small stoves, which were highly portable and relatively inexpensive. Despite these advances, at the end of the century approximately 40 percent of the world's population still relied on biomass as a source for cooking.[6]

The continued use of coal in both developed and industrializing countries was a major contributor to pollution and climate change. Cleaner sources of energy (e.g., hydroelectricity) and non-hydro renewable sources (e.g., wind and solar) were already in use by the early twentieth century. Modern hydroelectric plants, incorporating the newly invented water turbine, debuted in the US and Canada in the 1880s. Germany, Australia, and Norway followed suit in the 1890s, and all these countries expanded their systems in the opening decades of the twentieth century. These new plants became symbols of progress and modernity, providing power for growing cities as well as rural electrification. Initially located on waterways near the towns and cities they served, hydroelectric plants were later constructed in more remote locations as they grew in scale.[7] In the latter part of the twentieth century, non-hydro sources—generated by wind turbines, solar panels, and the like—supplied a small but rising proportion of an ever-increasing worldwide demand for electricity.[8]

Experiments with nuclear energy began in the 1930s. The first nuclear reactor was built in the 1940s, which eventually led to the development of nuclear power as a clean but controversial source of electricity. According to the International Atomic Energy Agency, by the end of the twentieth century nuclear power was providing about 16 percent of electricity globally, with 83 percent concentrated in industrialized countries; nine European nations and the Republic of Korea made up the ten countries most reliant on nuclear power.[9]

New Building Materials and Advances in Structural Engineering

Twentieth-century building materials and construction techniques differed markedly from traditional materials and methods used in earlier centuries, although some building traditions were maintained for longer periods in vernacular architecture and in remote regions. Two key materials, concrete and hot-rolled steel, enabled new construction methods for most multistory structures. Concrete, sometimes reinforced and/or precast, became one of the most widely used materials in both urban and rural regions around the world. Many buildings and designed landscapes also illustrate "the creative and plastic use of concrete as an expressive medium for architectural ideas."[10] Concrete was employed in many styles—among them, Brutalism is characterized by a variety of exposed concrete surfaces—and in many forms such as foundations, arches, cantilevered roofs, cladding, decorative features, and monumental sculpture. It was also widely used in the construction of bridges, roads, aqueducts, canals, and other infrastructure.[11]

New engineered materials and techniques, including computer-aided design (which emerged in the early 1970s), enabled rapid, large-scale construction and efficient structural forms. This included the construction of progressively taller high-rise buildings, complicated architectural forms, and buildings that could be adapted to local conditions such as frequent earthquakes or hot climates.

Metal alloys are another important category of building material linked to the twentieth century. Chromium, nickel, and other elements were sometimes added to steel to provide greater strength, lighter weight, and fewer corrosive qualities. Aluminum, which was isolated in the nineteenth century, was difficult to separate from its ore (bauxite) until 1906, when a method of strengthening by adding copper was invented. The use of this lightweight material became more widespread by the 1950s following the development of extruded and sheet aluminum during World War II (WWII). Titanium, first isolated in 1910, was another architectural metal whose heat-resistant and noncorrosive qualities helped popularize its use, especially after WWII, when it was produced in larger quantities.[12]

One wholly twentieth-century invention was synthetic plastic, a polymer material derived from petrochemicals. The name *plastic* was coined by Leo Hendrik Baekeland, inventor of Bakelite, the first fully synthetic plastic, which was introduced in 1907 and ushered in the "age of plastics." Due to its low cost, versatility, transparency, and water resistance, plastic became omnipresent, sometimes replacing traditional materials such as rubber, wood, leather, and glass. The range of products and uses, including construction materials, continuously grew as new plastics were developed.

In the 1940s, the mass production and rapid deployment of wartime equipment and wartime construction utilized plastics and introduced many new materials and techniques that were adopted by architects and engineers and quickly utilized by builders and other industries after the war. These included new forms of prefabricated and temporary buildings, acrylic plastics, plastic laminates, extruded and sheet aluminum roofing, plywood, Masonite and other fiberboards, synthetic rubber, and gypsum products. Masonite (made of compressed wood pulp) was featured in the 1933–34 Century of Progress Exposition in Chicago and grew in popularity after it was used as an interior wall finish for Quonset huts during WWII. As a result, fiberboard was adopted as an economic wallboard,

especially in housing construction, in many countries after the war. Other new building materials and construction methods also enjoyed widespread use, including metal-framed curtain walling, prestressed concrete, and sheet glass.

Plastics and other synthetic polymers were among the advanced structural composites used not only in construction but also in many other roles, including medicine and electronics. These "miracle materials," as plastics and asbestos came to be known, also had unintended, deleterious consequences in the damage they caused to human health and the environment. Though the potential adverse health effects of asbestos were known, it was commonly used in building materials throughout the world for most of the twentieth century. "Cheap plastic" summarily "unleashed a flood of consumer goods."[13] By the end of the century, the environmental problems caused by plastics aroused serious concern, as gigatons of plastic waste increasingly polluted the world's oceans and took up space in its landfills.

Advances in Public Health and Medical Technology

Wartime advances in medical treatment had a profound effect on civilian health services and led to the establishment of many new hospitals, specialist clinics, and public health services. In particular, the introduction of sulfur drugs, antibiotics, and advances in medical imagery saved many lives and reduced the time patients spent in hospitals, prompting modifications to hospital design and the provision of specialist laboratories and health sciences centers.[14]

Improvements in health and welfare underpinned a "baby boom" in developed nations between 1945 and the early 1960s as well as a population explosion in developing nations. The global population rose from 1.6 billion at the beginning of the century to more than 6 billion at the end.[15] This demographic growth alone had a massive impact on the numbers of buildings of all types and in the destruction or reconfiguration of many older structures and of cultural and natural landscapes.

In the area of medical technology and public health, lower infant mortality rates and increased human longevity were owed to mass immunizations and advances in maternal and infant care. Vaccines were developed to combat a number of serious diseases, including tuberculosis (vaccine introduced in 1921) and polio (first used in 1955). The World Health Organization's Smallpox Eradication Programme (1966–80) carried out mass vaccinations in collaboration with countries around the world, eradicating smallpox by 1980. It was the first disease to have been fought on a global scale.[16] Over the course of the century, average life expectancy rose globally from around thirty-five years to more than sixty-five years, though this statistic masked a large disparity among countries.[17] The consequences of an aging population were also becoming evident by the end of the century, as reflected in the growth of agencies providing age-related health and welfare services as well as purpose-built housing for this growing demographic.

Alongside changes in technical sciences and medical treatments and the buildings that accommodated them, a radical transformation was taking place in the study and understanding of human behavior and mental processes. The emerging field of psychology not only affected individuals—based on the improved treatment of mental health disorders—but also had tangible effects on

entire communities, who now had access to facilities for the mentally ill. The change was graphically illustrated by the conversion or replacement of nineteenth-century "lunatic asylums" with psychiatric hospitals and outpatient units specializing in the treatment of mental disorders.

The Wide-Ranging Influence of Research and Development

The term *research and development* refers to the application of research to the development of products or services. Over the course of the twentieth century, a growing recognition of the strong link between these processes contributed to a boom in R&D laboratories operated by corporations, governments and their militaries, and universities.[18]

A small number of corporations in Europe and the US established scientific laboratories in the nineteenth and early twentieth centuries. Their development proceeded slowly, however, until the expansion of the arms industry during World War I (WWI) exposed the need for stronger links between science and industry; after the war, many industrialized countries sought to expand their R&D capacities. The need was further heightened by the advent of WWII, which led governments and industry to put their resources into developing new technologies to support the war effort. With European industry devastated by the war, the US emerged at midcentury as the world's industrial leader, adapting wartime scientific and technological advances to nonmilitary purposes.

Much research and innovation was driven by and carried out within commercial corporations, as industries turned the results of scientific research into marketable products and services. Those early research laboratories established by, for instance, Siemens in Germany (1905), Philips in the Netherlands (1914), and General Electric in the US (1900), grew into large enterprises involved in a range of products. Many of these companies' R&D divisions operated out of striking, modern buildings in suburban industrial-park settings that were dependent on workers arriving by car, as exemplified by Bell Laboratories in New Jersey, designed by Finnish-born US architect Eero Saarinen. In the second half of the century, commercial R&D laboratories proliferated, particularly in Western Europe, the US, and Japan. In 1947, Bell Laboratories demonstrated a new invention, the transistor, which became one of the century's most influential technologies and was "aptly...called the 'nerve cell' of the Information Age."[19] Companies such as BASF in Germany and Dow Chemical and Monsanto in the US were working on genetic modification of seeds, an innovation that led to disputes about the long-term implications of foods produced from such seeds (for more on environmental impacts of agriculture, see theme 3).[20] Major chemical and fertilizer companies came under increasing scrutiny, especially when their products were used in warfare—the dispersal of Agent Orange during the Vietnam War being an example—or were found to cause cancer.[21]

The Soviet government prioritized the pursuit of scientific research and development as fundamental to national politics and identity. Most research work in the USSR was carried out in specialized institutes or academies that, unlike those in many Western countries, were not affiliated with universities or private industry and were subordinate to governmental authority. In the 1950s, the People's Republic of China adopted a model in which research and production were strictly separated, with little research conducted in universities.

Acceleration of science and technology was most marked in response to the two world wars in 1914–18 and 1939–45 (for further discussion, see theme 10). During WWII, the application of "fundamental" research (nuclear physics) from the Manhattan Project made possible the atomic bombing of the Japanese cities of Hiroshima and Nagasaki. After the war, nuclear power generation was harnessed for civilian use.[22]

Scientific research and technological development contributed to new forms of mass media and telecommunications as well as the birth of the internet, which in turn accelerated research and gave people around the world unprecedented, rapid access to information (for more on the development of mass communications, see theme 5). The European Organization for Nuclear Research (CERN) was established in 1954 to promote cooperation between nations following WWII. Its complex, near Geneva, Switzerland, has been described as "a landscape of fascinations and contradictions laden with memory and meaning," a place where, in 1989, "in a modest office in an even more unremarkable corridor, Sir Tim Berners-Lee created the World Wide Web."[23]

Space Research and Exploration

The theory of relativity and quantum physics, developed by scientists such as Max Planck, Albert Einstein, and Niels Bohr in the first decade of the twentieth century, as well as actual space exploration, which began in the late 1950s, changed how people perceived the universe.

The first rocket to reach space was Germany's A4 (later known as V2), launched at Peenemünde in 1944 as part of the nation's WWII effort. After the war, many of the people involved in its development were hired by the US government to develop military technology and ultimately the lunar landing program. The Cold War, which started in 1945 between the USSR (and its satellite states) and the US (and its allies), ignited a competition in weapons development.

In 1957, the USSR launched Sputnik, the first artificial satellite, inaugurating the space race. The Soviets' success triggered fears in the US and other Western countries that they were lagging behind technologically. In response, the US established the National Aeronautics and Space Administration (NASA) in 1958, which worked to carry out President John F. Kennedy's edict to put a man on the moon before the end of the 1960s. On July 20, 1969, television audiences worldwide watched as the Apollo 11 astronauts landed on the moon and stepped out to explore its surface. The lunar module left behind bears a plaque that reads: "Here men from the planet Earth first set foot upon the moon. July 1969 A.D. We came in peace for all mankind."[24]

Weapons testing ranges, tracking stations, rocket launch sites, and spaceports were established in such far-flung locales as Florida's Cape Canaveral (US), Kazakhstan (USSR), Woomera (Australia), and French Guiana (South America). From the 1970s, progressively larger and more sophisticated satellites were launched into orbit, not only by the USSR / Russian Federation and the US but also by the European Space Agency, China, Japan, and other countries. Satellites expedited an expansion of international communications and surveys both of the solar system and of Earth itself. Eventually such satellites were serviced by space shuttles—reusable spacecraft first launched in 1981—that also carried people into space, housed scientific experiments, and facilitated the construction of the International Space Station, which began in 1998.

Late in the twentieth century, the scientific study of "big things" on and beyond Earth continued as large optical reflective telescopes were erected in the US at Mauna Kea Observatory in Hawaii, in Chile at Paranal Observatory in the Atacama Desert, and elsewhere.[25] Conversely, the new field of nanoscience involved the study of extremely small things. Nanotechnology was established in 1981 with the development of a scanning tunneling microscope that enabled scientists to see individual atoms. This instrument was used across scientific fields including chemistry, biology, physics, materials science, and engineering.[26]

Photo Gallery

The table below lists a selection of subthemes and types of places related to theme 2 and is excerpted from "Twentieth-Century Themes, Subthemes, and the Places That Exemplify Them" (see pp. 10–15). It is followed by a gallery of photos showing a diverse range of buildings, sites, structures, and landscapes from around the world that exemplify the issues and subthemes discussed. The text accompanying each photo explains how that place represents the theme of the preceding essay. Some of these places may already be listed as heritage places (from local inventories to the World Heritage List) while others are not, though they *may* be identified as significant in the future. Some are specifically mentioned in the text; many are not. All are included here as exemplars to prompt broad exploration of potential heritage places.

Theme 2	ACCELERATED SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT
Subthemes	**Types of Places**
• Increasing pace and scale of scientific change • Development and transportation of new energy sources • Development of new building materials and construction techniques • Advances in engineering • Advances in delivery and administration of public health • Development of new medical technologies • Advances in understanding of human behavior and mental health • Application of research to development of products and services • Adaptation of military technology to civilian and commercial use • Space research and exploration	• Oil refineries • Renewable energy installations and power plants • Nuclear sites and power stations • Structures built with new building materials • Structurally innovative buildings and structures • Hospitals and medical facilities, sanatoriums, geriatric care facilities, and mental health facilities • Research and development facilities • Scientific laboratories • Space research sites, launch sites, and satellites

▲ **Figure 2.1. Paimio Sanatorium, 1930–33, Paimio, Finland.** Responding to a public health need for specialized facilities to combat tuberculosis, the government of Finland began subsidizing public sanatorium projects in 1930, paying three-quarters of construction costs. A federation of municipalities in the southwestern part of the country selected Finnish architect Alvar Aalto to design this asymmetrical, reinforced-concrete facility. With two separate wings and open balconies that allowed patients access to fresh air and sunlight, it became a model institution, reflecting how early twentieth-century advances in public health and creative architectural design were interconnected.

Photo: 2009, ©Sheridan Burke.

◀ **Figure 2.2. Mubarek Oil Field, 1974, Sharjah (offshore), United Arab Emirates.** These offshore oil rigs—comprising wells, a processing platform, and support structures—were erected by the Crescent Petroleum Company in the early 1970s to facilitate the rapid extraction of more than sixty thousand barrels of petroleum daily. They reflect how skilled engineers had become in discovering and distributing oil for export and profit, especially in the Persian Gulf region.

Photo: 2009, Crescent Petroleum / Icethorn, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 2.3. Tokai Nuclear Power Plant, 1966–78, Tokai, Japan. The country's first commercial nuclear power plant consists of two separate units. The first, built in the early 1960s, went online in 1966 and was decommissioned in 1998. A second unit, built at the site in the 1970s, was the first in Japan to produce more than a thousand megawatts of electricity. In March 2011, the second unit automatically shut down as a result of the Tōhoku earthquake and tsunami, which brought on Japan's first-ever nuclear disaster, at Fukushima. As of May 2019, operations at Tokai remain suspended.

Photo: 2014, US Department of Energy, courtesy Wikimedia Commons, public domain.

Figure 2.4. Nesjavellir Geothermal Power Plant, 1990, Thingvellir, Iceland. This facility, the second-largest geothermal power station in Iceland, serves the space-heating and hot-water needs of Reykjavik by tapping into the earth's heat and using underground water to operate a turbine, which generates electricity. In the early twentieth century, the rising demand for electricity led to the search for new sources of electric power. Geothermal electricity was first produced commercially in Italy in 1913. While other countries experimented with it, it was not until 1958 that the second major geothermal plant opened, in New Zealand. Additional plants followed, continuing the ever-expanding search for electrical power sources.

Photo: 2006, Gretar Ívarsson, courtesy Wikimedia Commons, public domain.

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Figure 2.5. Sydney Opera House, 1958–73, Sydney, Australia. Designed by Danish architect Jørn Utzon with British-born Ove Arup as structural engineer, the structure features three groups of interconnecting, vaulted concrete shell structures set on a monumental podium on a harbor peninsula. To understand the complex forces to which the curving, precast panels and arches would be subjected, the designers were among the earliest to use computers in structural analysis. The site was inscribed on the World Heritage List in 2007 as a "masterpiece of human creative genius."

Photo: 2007, ©Sheridan Burke.

Figure 2.6. Salginatobel Bridge, 1929–30, Schiers, Switzerland. This reinforced-concrete structure, which spans an alpine valley, is the earliest surviving hollow-box, three-hinged arch bridge designed by Swiss civil engineer Robert Maillart. Its concrete arch ring and deck are joined by longitudinal sidewalls. Visually elegant and technically brilliant, the bridge exemplifies the link between new building materials (e.g., concrete) and advances in engineering (e.g., bridge building) in the twentieth century.

Photo: 2008, Rama, courtesy Wikimedia Commons, CC BY-SA-2.0.

Figure 2.7. Hongkong and Shanghai Banking Corporation (HSBC) headquarters, 1979–86, Hong Kong, China. Located in central Hong Kong, the HSBC was designed by British architect Norman Foster and structural engineering firm Arup Partners, based in London. It is an example of the High-Tech phase of modern architecture, which clearly expresses the building's structural system and materials and a high degree of prefabrication. The pronounced exterior mast structure and placement of exposed service cores on the outside edges of the towers allow for an open interior free of structure. This included a ten-story atrium, on top of which a mirrored sun scoop reflected light down through the atrium to the ground-level plaza.

Photo: 2008, WiNG, courtesy Wikimedia Commons, CC BY-3.0.

Figure 2.8. Futuro House, 1968–1970s, Saint-Ouen, France. Designed by Finnish architect Matti Suuronen, these small dwellings, known as Futuros, exemplify the application of factory prefabrication to residential construction to reduce construction costs and time. Originally intended for use as portable ski chalets, approximately one hundred of these flying saucer–shaped abodes were distributed to owners all over the world. Composed of fiberglass-reinforced polyester plastic, polyester-polyurethane, and poly(methyl methacrylate), each house measures four meters (thirteen feet) high and eight meters (twenty-six feet) in diameter. The example pictured here is being used today not as a home but as part of a flea market.

Photo: 2019, Andre.o.mob, courtesy Wikimedia Commons, CC BY-SA-4.0.

Figure 2.9. Kaédi Regional Hospital extension, 1992, Kaédi, Mauritania. This complex, an extension to an earlier, concrete-framed hospital building, brought improved medical facilities to a largely rural population. It is the largest health facility in southern Mauritania. Architects Fabrizio Carola and Birahim Niang were tasked with developing new, low-cost construction techniques that utilized local materials and labor and could be replicated in other building types throughout the region. Their solution was a passively cooled series of mud-brick domes connected by vaulted corridors.

Photo: 2009, Alexis Doucet, courtesy Wikimedia Commons, CC-BY-SA 3.0.

Figure 2.10. Salk Institute for Biological Studies, 1962–65, La Jolla, California, USA. This nonprofit scientific research institute was founded by Jonas Salk, developer of the first polio vaccine. Designed by American architect Louis Kahn, the Salk is a self-contained twenty-seven-acre (eleven-hectare) campus. It incorporates flexible laboratories that can accommodate specific research needs, private offices for the head scientists, and meeting spaces and support services, all arranged around a quiet central plaza opening out to the Pacific Ocean. The institute exemplifies a quest for scientific solutions to medical and environmental problems in the second half of the twentieth century.

Photo: 2017, Sara Lardinois, © J. Paul Getty Trust.

Figure 2.11. Bell Laboratories, 1959–62, Holmdel Township, New Jersey, USA. This suburban complex functioned for forty-four years as a private industrial R&D facility, initially for the Bell System and later for Bell Labs. The centerpiece of the corporate campus is a structure by Finnish-born US architect Eero Saarinen that accommodated more than six thousand engineers and researchers. The building has been rehabilitated and since 2013 has housed retail spaces, restaurants, and offices for high-tech startup companies.

Photo: 2008, Lee Beaumont, revisions by MBisanz: courtesy Wikimedia, CC BY-SA-2.0.

Figure 2.12. Mawson's Huts, 1911, Cape Denison, Antarctica. Named after Australian geologist and explorer Douglas Mawson, these prefabricated huts are the principal remains of the Australasian Antarctic Expedition of 1911–14. The huts provided shelter and laboratory space for members of the expedition, who were the first to pioneer the use of wireless communication on the Antarctic continent as they engaged in magnetic charting (for navigational purposes), geological studies, and biological documentation. The site is a remnant of the "heroic era" of Antarctic exploration (1897–1917), when ten countries launched a total of seventeen expeditions to advance scientific and geographic knowledge of the continent.

Photo: 2006, David Killick, courtesy Wikimedia, public domain.

Figure 2.13. Vehicle Assembly Building (VAB), John F. Kennedy Space Center, 1965, Merritt Island, Florida, USA. Construction of this building began in 1963 as part of efforts by NASA to send astronauts to the moon through the Apollo program. At 525 feet (160 meters) high, the enormous concrete and steel structure was designed to allow the vertical construction of rockets; upon completion, it was one of the largest buildings by area in the world. The VAB has played an instrumental role in the history of US space flight. In this photo, dated 1970, the Apollo 14 space vehicle is being prepared for launch and will transport the third manned mission to the moon.

Photo: 1970, NASA.

Figure 2.14. Biosphere II, 1987–91, Oracle, Arizona, USA. This innovative scientific research facility was designed to emulate the earth's environment to assess whether humans could build self-sustaining colonies in outer space. Essentially a giant terrarium, the privately funded, 3.14-acre (1.27-hectare), airtight steel-and-glass structure holds five biomes, including living quarters and agricultural areas. It is the largest closed system ever constructed. In 1991, a team of four men and four women were sealed inside for a two-year period to study survivability; a second, much shorter mission was conducted in 1994. It is currently operated by the University of Arizona.

Photo: 2016, Katja Schulz, courtesy Wikimedia Commons, CC BY-2.0.

Figure 2.15. Cerro Tololo Inter-American Observatory, 1963–74, Atacama Desert, Chile. The mountaintop site for this astronomical observatory was selected by a Chilean-US team of scientists in 1962 in order to locate a new modern telescope in the Southern Hemisphere that would allow improved observation of astronomical objects unique to the southern sky. Several high-powered telescopes were erected here and at other observatories in northern Chile, where atmospheric conditions were optimal for astronomical research. These sites epitomize the quest for space exploration in the second half of the twentieth century.

Photo: 2005, David Walker, courtesy Wikimedia Commons, CC BY-SA-3.0.

NOTES

1. Brandon Walton, "A Brief History of Solar Energy," Solar United Neighbors (web page), November 19, 2015, https://www.solarunitedneighbors.org/news/brief-history-solar-energy-2/.
2. Mathias Aarre Maehlum, "Where Is Solar Power Used the Most?," Energy Informative (web page), June 4, 2014, https://web.archive.org/web/20181031192908/http://energyinformative.org/where-is-solar-power-used-the-most/.
3. Bill McKibben, "The Race to Solar-Power Africa," *New Yorker*, June 19, 2017, https://www.newyorker.com/magazine/2017/06/26/the-race-to-solar-power-africa.
4. Jordan Hanania et al., "Coal Fired Power Plant," Energy Education, University of Calgary, last modified February 24, 2019, https://energyeducation.ca/encyclopedia/Coal_fired_power_plant.
5. International Energy Agency, "Coal," IEA Atlas of Energy, accessed March 3, 2020, http://energyatlas.iea.org/#!/tellmap/2020991907/1.
6. International Energy Agency, *World Energy Outlook 2006* (Paris: International Energy Agency and Organization for Economic Cooperation and Development, 2006), 419, https://www.iea.org/reports/world-energy-outlook-2006.
7. Pierre-Louis Viollet, "From the Water Wheel to Turbines and Hydroelectricity: Technological Evolution and Revolutions," *Comptes Rendus Mécanique* 345, no. 8 (August 2017): 570–80 passim.
8. International Energy Agency, *World Energy Outlook 2000* (Paris: Organization for Economic Cooperation and Development and International Energy Agency, 2001), 48, fig. 2.1.
9. International Atomic Energy Agency, "IAEA Releases Nuclear Power Statistics for 2000," news release, May 3, 2001, https://www.iaea.org/newscenter/pressreleases/iaea-releases-nuclear-power-statistics-2000.
10. "New Campaign to Protect Aichi Prefectural University of Fine Arts," Docomomo International, last modified September 16, 2011, https://www.docomomo.com/2011/09/16/aichi-prefectural-university-of-fine-arts-and-music/.
11. Peter Chadwick, *This Brutal World* (London: Phaidon, 2016); and Christopher Beanland, *Concrete Concept: Brutalist Buildings around the World* (London: Frances Lincoln, 2016).
12. See "High-Performance Materials History Part 1—Metals," Greatest Engineering Achievements of the 20th Century, National Academy of Sciences, accessed April 24, 2019, http://www.greatachievements.org/?id=3809.
13. Susan Freinkel, "A Brief History of Plastic's Conquest of the World," *Scientific American*, May 29, 2011, https://www.scientificamerican.com/article/a-brief-history-of-plastic-world-conquest/.
14. Heritage Alliance, *Survey of Post-War Built Heritage in Victoria: Stage One*, vol. 1, *Contextual Overview, Methodology, Lists & Appendices*. (North Melbourne: Heritage Alliance; [Melbourne]: Heritage Victoria, 2008), 27, https://www.heritage.vic.gov.au/research-and-publications/thematic-and-typological-studies/survey-of-post-war-built-heritage-in-victoria-stage-one.
15. Richard Overy, *Collins Atlas of 20th Century History* (London: Collins, 2005), 166.
16. "The Smallpox Eradication Programme—SEP (1966–1980)," World Health Organization, last modified May 2010, http://www.who.int/features/2010/smallpox/en/.
17. Max Roser, "Life Expectancy," Our World in Data, last modified October 2019, https://ourworldindata.org/life-expectancy.
18. *Encyclopedia Britannica*, s.v. "Research and Development," by William K. Holstein and Thomas S. McLeod, last modified July 2, 2013, https://www.britannica.com/topic/research-and-development.
19. Michael Riordan, Lillian Hoddeson, and Conyers Herring, "The Invention of the Transistor," *Review of Modern Physics* 71, no. 2 (1999): S336.
20. See Jon Gertner, *The Idea Factory: Bell Labs and the Great Age of American Innovation* (New York: Penguin, 2012); E. N. Brandt, *Growth Company: Dow Chemical's First Century* (East Lansing: Michigan State University Press, 1997); and Marie-Monique Robin, *The World According to Monsanto: Pollution, Corruption, and the Control of the World's Food Supply* (New York: New Press, 2010).
21. There is a large literature on this subject. See, for example, Jack Doyle, *Trespass against Us: Dow Chemical and the Toxic Century* (Monroe, ME: Common Courage Press, 2004).

22. "Outline History of Nuclear Energy," World Nuclear Association, last modified April 2019, www.world-nuclear.org/information-library/current-and-future-generation/outline-history-of-nuclear-energy.aspx.

23. University of York, "Getting to the Heart of the Matter: CERN's Hidden Heritage," Phys.org, June 8, 2015, https://phys.org/news/2015-06-heart-cern-hidden-heritage.html.

24. "July 20, 1969: One Giant Leap for Mankind," National Aeronautics and Space Administration, last modified July 20, 2019, https://www.nasa.gov/mission_pages/apollo/apollo11.html.

25. Christopher McFadden, "A Brief History of the Telescope: From 1608 to Gamma Rays," *Interesting Engineering* (blog), May 27, 2018, https://interestingengineering.com/a-brief-history-of-the-telescope-from-1608-to-gamma-rays; and *Encyclopedia Britannica*, s.v. "Very Large Telescope," by Erik Gregersen, last modified September 18, 2019, https://www.britannica.com/topic/Very-Large-Telescope.

26. "What Is Nanotechnology?," US National Nanotechnology Initiative, accessed July 20, 2019, https://www.nano.gov/nanotech-101/what/definition.

Theme 3

Mechanized and Industrialized Agriculture

Stimulated by the invention of machines, most significantly the gasoline-powered traction engine, or tractor, agriculture grew at a rapid pace in many parts of the world. Mechanization led to dramatic changes in rural landscapes as larger and larger farm holdings could be worked by fewer people. This contributed to the depopulation of rural areas and the decline of small towns as people migrated to larger cities in search of alternative employment. Despite the trend toward industrial-scale farming in some places, small family farms continued to make up the dominant rural land use in much of the world, and subsistence farming persisted throughout the twentieth century.

Demand for food grew along with the world's population. After World War II (WWII), the development and intensive use of synthetic pesticides and fertilizers, the introduction of high-yield and genetically modified crops, and improvements in water management and irrigation greatly increased global food production. Based on these factors, agricultural expansion also had negative environmental impacts. In the last quarter of the century, new forms of farm production such as hydroponics, feed-lots, aquaculture, wind farms, and biofuels manifested swiftly, as did the revival of traditional organic farming practices.

Changing Rural Landscapes

Millions of acres around the world were stripped of their indigenous vegetation for all manner of farming purposes, from grazing land for cattle and sheep to large-scale wheat farming. On city fringes, undeveloped land and forest ecosystems gave way to farmland—market gardens, dairies, and poultry farms in particular—and gradually to urban development. In more densely populated regions, natural landscapes at greater distances from cities were cleared for large-scale industrialized agriculture.

In most societies, massive numbers of people left farms for towns and cities, albeit at different rates in different countries and landscapes (for more on mass migration, see theme 1). This happened in the early decades of the twentieth century in places that invested in large-scale mechanized agriculture,

such as the US, Canada, and Australia, and later in other countries, including Mexico, Argentina, and China. A comparison of the numbers of workers in developing countries who were mainly dependent on agricultural income at the middle and the end of the twentieth century indicates a significant rural decline. In Southeast Asia, the percentage of workers in agriculture dropped from 76 percent in 1950 to 41 percent in 2000; in Latin America and the Caribbean, from 55 percent to 21 percent; and in sub-Saharan Africa, from 87 percent to 64 percent during the same time period.[1]

Subsistence and small-scale agriculture survived in some societies and for some products. Rice, cultivated in paddy fields in parts of Asia with high rainfall, continued to be tended by farm labor rather than agricultural machinery. Throughout much of South America, especially in areas rich in soil, the growing of mixed crops on small allotments proceeded. In many places, the landscape of small fields and enclosures fell away as large-scale agriculture became more economical. Redundant farm buildings and structures were destroyed or abandoned, and old ways of farming and patterns of agricultural land use were lost.

Mechanization and Its Impact on Productivity

The shift away from manual and animal-powered to mechanized agriculture in the early decades of the twentieth century was sparked by the introduction of the tractor, a low-speed vehicle used to haul loads and to pull or push farm equipment. Originating in the late nineteenth century and initially powered by steam, tractors with internal combustion engines were being produced in the US, Germany, and the UK in the opening decades of the twentieth century.[2] The advent of the tractor significantly increased agricultural productivity, though its use spread at different rates. Facing high labor costs and large farm sizes, the US adopted it between the 1920s and 1950s, and the USSR followed suit in the 1930s.[3] At the onset of World War I, there were only five hundred tractors in Britain. After German U-boats sank merchant ships bound for Great Britain carrying agricultural produce from the British Empire, the British government was forced to turn to larger farms and mechanized techniques, importing thousands of tractors from the US.[4] Prior to this, most British farmers were still reliant on horses or other draft animals and on very labor-intensive modes of production, as were farmers in Western and Eastern Europe and in Asian, African, and South American countries that could afford working animals. Tractors did not completely supplant these animals on most farms until the 1950s and even later in many places in Eastern Europe, Latin America, Asia, and Africa.[5]

Continual improvements to the tractor, including the advent of a diesel-engine model, contributed to exponential increases in farm productivity, as did the development of other types of equipment, such as aerial crop dusters (introduced 1921); tractor-driven harvesters (1922) and hay balers (1932); the self-propelled combine, which was a thresher and reaper in one (1938); self-propelled irrigation sprinklers (1948); air seeders, which plant seeds automatically (1956); and electronic monitoring devices for planting crops (1966).[6] Wherever farm machinery appeared, the necessary support systems—fuel stations, repair shops, and the like—followed.

As the tractor dramatically increased productivity and reduced the need for labor, so did the spread of rural electrification, which was extensive in closely settled parts of Europe and Japan by the 1930s but slower elsewhere. Life became easier for farmers and their families in terms of day-to-day living and

the storage of agricultural produce. By 2000, 65 percent of the rural population worldwide had access to electricity.[7] This encouraged the development of larger agricultural enterprises. For instance, electrically powered refrigeration units, which larger operators and farm cooperatives could afford, enabled cold storage of produce and dairy products and extended their life span. Electricity provided access to an ever-wider array of agricultural machinery, from water pumps to shearing equipment and milking machines. It also improved the comforts of farm life and connected remote farmsteads to the world through access to such amenities as the radio, the telephone, and eventually the television.

In addition to energy, mechanized food production required vast amounts of water, readily available in some regions but scarce elsewhere, especially in parts of Africa where famine remained a constant threat. Throughout the century, many countries invested heavily in irrigation schemes, sometimes also associated with hydroelectric power. At inception, these schemes were welcomed, though their environmental impacts were not well understood. Huge acreages were systematically leveled for farming and developed for irrigation, often beyond sustainable climatic zones, resulting in soil depletion and erosion.

During the Great Depression of the 1930s, several industrialized countries funded construction of irrigation schemes and dams and electrification projects as part of their economic recovery efforts, providing work for the unemployed. Perhaps the best known was the massive concrete Hoover Dam (completed 1936) on the Colorado River in the western United States. Construction of immense water infrastructure projects continued throughout the century, and a number of these schemes have since been heritage listed.

In the midst of the Cold War, the Soviet and capitalist blocs competed in a dam construction race.[8] This is perhaps best exemplified by the political controversy from the mid-1950s to 1970 surrounding the erection of Egypt's Aswan Dam to control flooding of the Nile, which had profound effects on important archaeological sites. These national decisions, in turn, influenced the creation of the UNESCO World Heritage Convention (for more on the development and growth of conservation organizations, see theme 7). Large dams constructed from the 1970s to the present in regions such as Southeast Asia, Africa, Oceania, and South Asia have also stirred controversy because of their social and environmental impacts.[9]

Over the course of the twentieth century, technological advances irreversibly altered rural life and landscapes in ways that varied from place to place. The scale of farming increased dramatically, field patterns changed, old farm buildings were destroyed or adapted to new uses, and new types of structures were developed. The increased agricultural output mandated an increase in the size of storage facilities, giving rise to massive grain elevators and silos. In some cases, these changes involved merely adapting traditional farming practices and buildings to different circumstances. For instance, in cold climates, livestock still had to be brought under cover in winter, but new equipment such as harvesters and tractors also required protection from weather. In addition, the mechanization of agriculture greatly reduced the need for farm labor, accelerating the population shift from rural to urban areas.

As the practice of farming changed and the old ways grew obsolete, some communities sought to conserve the remnants of an earlier, rural way of life. Open-air museums were envisioned to preserve redundant farm buildings and historic practices. The first of these, Skansen, in Stockholm, Sweden, opened in 1891. Since then, innumerable museums devoted to farming landscapes, buildings, artifacts, and methods have been established in many places around the world.

Industrialized Food Processing

Processing plants for agricultural products—from canning factories to abattoirs (slaughterhouses)—were modernized in response to technological advances, mechanization, and the application of industrial production methods. By the 1960s, even eggs were collected on an industrial scale, aided by the use of cages and conveyor belts in modernized establishments.[10] As with other forms of mechanized production, considerable capital was needed to make processing and storage facilities a reality. In many countries, agricultural plants involved in everything from poultry farming and cheese making to sugar refining were owned either by farmer cooperatives or by corporate interests seeking to invest in food production, including systems of distribution to local and international markets. Larger corporations increasingly committed financially to the production of concentrates, from tomatoes to powdered milk, which simplified the movement of foodstuffs because of their efficient storage and reduction in refrigeration requirements.

The internal layout and machinery of twentieth-century agricultural plants was frequently modified to accommodate new processes within existing buildings. When older structures could not accommodate the modifications, the structures became redundant. In the latter decades of the century, as bigger plants became more common, smaller abattoirs, poultry and dairy farms, packinghouses, and other agricultural enterprises that were not economically viable were shut.

In many places, food processing plants were moved to locations better served by major highways, where new food distribution centers were built as trucking came to dominate freight distribution networks in the second half of the century. In India, for instance, nearly 80 percent of freight was carried by rail in 1950. Road freight overtook rail in the late 1980s and by century's end was carrying some 60 percent.[11] This modal shift has been attributed to rail's inability to meet capacity and trucking's ability to provide door-to-door service, and has resulted in massive investments in road infrastructure.[12] The change was also reflected in employment patterns. In the year 2000, US railway workers numbered 232,000, whereas the number of trucking industry employees was 1,406,000.[13] Improvements in transportation and refrigeration meant that fresh produce, meats, dairy products, and seafood could be shipped greater and greater distances, creating what evolved into a global system of food trade in which formerly seasonal products were now available year-round.

Farm Ownership

With the exception of communist countries, most farmland around the world was privately owned, though not necessarily by the people who worked it. The majority were family farms—either owned

or rented—with family members supplying some or all of the labor. These ranged from large, increasingly mechanized farms to small, labor-intensive operations.[14] Subsistence farming persisted in many places, particularly sub-Saharan Africa.

Over the course of the twentieth century, farming became less labor intensive as high-tech equipment, improved seeds, and new pesticides were developed. Many of these new methods required large capital investments. In Australia, South America, the US, and other parts of the world, this drove a trend toward the consolidation of small farm operations into large cooperatives or corporations, particularly in the second half of the century.[15] Increasingly, these large farms focused on production of a single commodity rather than a variety of vegetables and livestock, as family farms formerly did.

Large corporate agricultural enterprises enjoyed economies of scale. Vertical integration of production, processing plants, and distribution networks impacted modes of freight and construction of transport infrastructure and changed settlement patterns. By the end of the century, intensive farming techniques such as feedlots, greenhouses, and hydroponics (growing plants in water without soil) had become established features of agricultural production. Growing corporate control over food production, security, market access, and trade conditions made it difficult for smaller food producers to compete, and many went out of business. What had once been farmland was given over to new uses such as housing subdivisions and industrial parks.

Farming in communist countries was controlled by the state. Following the socialist revolutions in Russia, China, Cuba, Vietnam, and elsewhere, collective farms (*kolkhozes*) or state-owned farms (*sovkhoses*) reconfigured agricultural production on noncapitalist models, which had far-reaching sociocultural and landscape implications. In the USSR, collectivization and government control reached levels never before seen, creating full employment economies where, theoretically, everyone was well fed, but in practice some remote areas and ethnic groups continued to be marginalized.[16] The People's Republic of China adopted Soviet models in the early 1950s, creating large communes or collective farms under Chairman Mao Zedong's leadership.[17] Toward the end of the century, China, Vietnam, and a number of Eastern European countries had moved to decollectivize.[18]

Land reforms took place in many parts of the world. Following WWII, a number of governments, especially in parts of Asia, South America, and Africa, undertook these programs in an effort to create a more equitable distribution of agricultural land. Many were in places where Indigenous populations had been discriminated against by colonial occupiers who promoted plantations and farms owned by their own nationals. Some of the more successful land reform actions—known as land-to-the-tiller programs—were carried out in Taiwan, Japan, and South Korea, where tenant farmers became owners of the same land they had worked as tenants.[19]

Environmental and Land Use Impacts of New Agricultural Practices

Developments in agricultural science marked every decade of the twentieth century. Many countries established farm advice agencies to educate farmers about new techniques, such as the merits of

crop rotation, ways to improve and conserve soil, options for disease prevention, and removal of weed infestations. Agricultural fairs and exhibitions showcasing local industry continued to be popular as in previous centuries and played an important role in introducing new technologies to farmers. Many took place on permanent showgrounds, leaving a legacy of purpose-built structures.

Beginning in the 1940s, the Green Revolution—a set of collaborative initiatives between governments and NGOs to increase agricultural yields and eliminate hunger through the use of more powerful fertilizers, irrigation schemes, modified seeds, and higher-yield crop varieties—had a significant impact in both improving agricultural output and altering rural landscapes. A "technological package exported from the First World to the Third," the Green Revolution had its greatest impact in the 1960s and 1970s.[20] The need for irrigation drove large dam-building programs in many places, including China, India, and Mexico.[21] The resulting increases in crop yields were impressive, and many countries became self-sufficient in growing basic food crops, including wheat, maize, and rice. But the Green Revolution had some unintended consequences that impacted cultural landscapes. It promoted monocultures, which enabled farmers to save money by purchasing the necessary seed and fertilizer in bulk for only a single crop. Because monocultures are susceptible to pests, there was an increase in the use of new, powerful pesticides.

Fertilizers and pesticides were viewed as miracle products in combating the age-old issue of insect and animal pests and invasive plants. It took time to grasp the unforeseen and often negative effects on the environment, as well as on humans and animals. Phosphate, used in fertilizer, was mined in huge operations that dramatically altered their immediate environments. Before their deposits ran out in the 1980s, small islands such as Christmas Island and Nauru were the world centers of production. In 1999, the top four phosphate rock producers became the US, China, Morocco and Western Sahara, and the Russian Federation, which accounted for 72 percent of the world total.[22]

Rachel Carson's book *Silent Spring* (1962) drew international attention to the impact of decades of chemical use in farming, including DDT, which had been hailed as a universally safe and effective form of insect control (for more on pollution and the environment, see theme 7). Aerial crop spraying of pesticides had become commonplace on larger farms after the 1920s, and its deleterious effects could be seen not only on monoculture farming but also on the farmers and their families, as the spread of pesticides led to increases in the incidence of cancer and other diseases.[23]

Much of the world's twentieth-century agricultural expansion required land clearance. Native forests were razed to make way for plantation timbers destined for building or paper manufacture, or for pasture or cash crops, including palm oil. Industrial forestry aimed to produce as much commercially valuable timber per acre as possible, and as quickly as possible, through large-scale clearcutting, replanting of trees in monocultures, and heavy application of herbicides and fertilizers. Timber harvesting was kept on a short rotation: thirty to fifty years in temperate regions. Tropical rainforests were decimated as rare timbers were culled for export. In some areas, land clearing not only destroyed native vegetation but also forced the removal of Indigenous inhabitants, separating them from their land and cultural sites.

Farmers increasingly began specializing in single crops. Over time, and to keep up with changes in market demand and prices, some farmers substituted one form of monoculture for another. For example, as the consumption of beef rose worldwide, many sheep farms switched to cattle, a higher-value product. Single-crop plantations became the dominant mode of production for many high-value products: rubber, tea, coffee, sugar, and palm oil.

Early in the twentieth century, attention turned to biofuels—fuels derived from plant or algae material or animal waste. French-German engineer Rudolf Diesel, for instance, designed his namesake engine to run on a variety of fuels, including vegetable oil. However, the rise of cheaper crude oil, used to make petroleum diesel and readily available from the 1920s on—first in the US and later sourced from the Middle East, Venezuela, and other countries—meant that biofuels would remain largely undeveloped for the first half of the century.[24] Wartime shortages followed by the oil crisis of the 1970s prompted renewed interest in economically viable biofuels; this accelerated in the 1990s in response to tougher emissions standards. The use of land for biofuel production raised concerns over food and water security, which differed from region to region. While these fuels were promoted as a low-carbon alternative to petroleum products, the production of feedstock for their manufacture contributed to deforestation and the conversion of agricultural land from food-crop to non-food-crop production. By century's end, the US led world production of ethanol, primarily derived from soybeans. Brazil, the second-largest producer, launched an extensive bioethanol program in the mid-1970s that relied on sugarcane as feedstock.[25]

Commercial production began of some foods that previously were caught or harvested wild from the natural environment, a prime example being fish and seafood. Fishing was once the preserve of coastal communities trawling nearby waters, but as demand increased and the ocean's stocks diminished, commercial fish-farming operations sprouted up, cultivating salmon, prawns, crayfish, and other delicacies. Just as land-based farmers had embraced fertilizers and pesticides, fish farming, also called aquaculture, entailed using not only new types of feed but also antibiotics to stem the spread of disease. The by-products of these operations—waste material, chemicals, uneaten food, and dead fish—made their way back into the environment and disrupted natural ecologies, which could take decades to recover. Some nations established marine parks in an attempt to restrict the operation of commercial trawlers that had decimated fish stocks. Disputes over fishing grounds became increasingly common. Australia's Great Barrier Reef Marine Park, the largest in the world, was created in 1975 to protect its ecological values and manage activities within the area, notably the impacts on water quality of agriculture and pesticide loads, urban development, and a burgeoning tourism industry.

Although subsistence farming continued and family-operated farms remained in many parts of the world, by the end of the century intensive farming techniques were being employed in other areas. Around the same time, significant advances were made in the science and practice of hydroponics and aquaculture.[26] Glass greenhouse structures were replaced by polytunnels, or hoop greenhouses. Wind and solar farms for energy production began to appear in the late 1990s and created additional uses for farmland. Such innovations significantly altered some agricultural landscapes.

As the century came to a close, the negative impacts of soil depletion, land clearing, and inadequate water management regimes—habitat damage, biodiversity loss, aridity, soil erosion, dust storms, landslides, degradation due to nutrient imbalances, increasing greenhouse gas emissions, and so forth—were all too apparent.[27]

Concerns over the increasingly mechanized production of food gave rise to the Slow Food movement. Launched in Italy in the 1980s, it promoted the production and consumption of sustainable, traditional foods. As Slow Food's popularity soared across the world, many small local businesses thrived, and its proponents became more politically active both nationally and internationally, arguing against the globalization of agriculture products.[28] Roughly contemporaneous with this movement was the revival of the global interest in producing and consuming organic food.[29] The concepts of organic farming and biodynamic agriculture were born out of a response to the accelerating environmental damage and loss of traditional organic practices following the advent of chemical agriculture between the two world wars. Today the practice of organic farming continues to grow worldwide.

Photo Gallery

The table below lists a selection of subthemes and types of places related to theme 3 and is excerpted from "Twentieth-Century Themes, Subthemes, and the Places That Exemplify Them" (see pp. 10–15). It is followed by a gallery of photos showing a diverse range of buildings, sites, structures, and landscapes from around the world that exemplify the issues and subthemes discussed. The text accompanying each photo explains how that place represents the theme of the preceding essay. Some of these places may already be listed as heritage places (from local inventories to the World Heritage List) while others are not, though they *may* be identified as significant in the future. Some are specifically mentioned in the text; many are not. All are included here as exemplars to prompt broad exploration of potential heritage places.

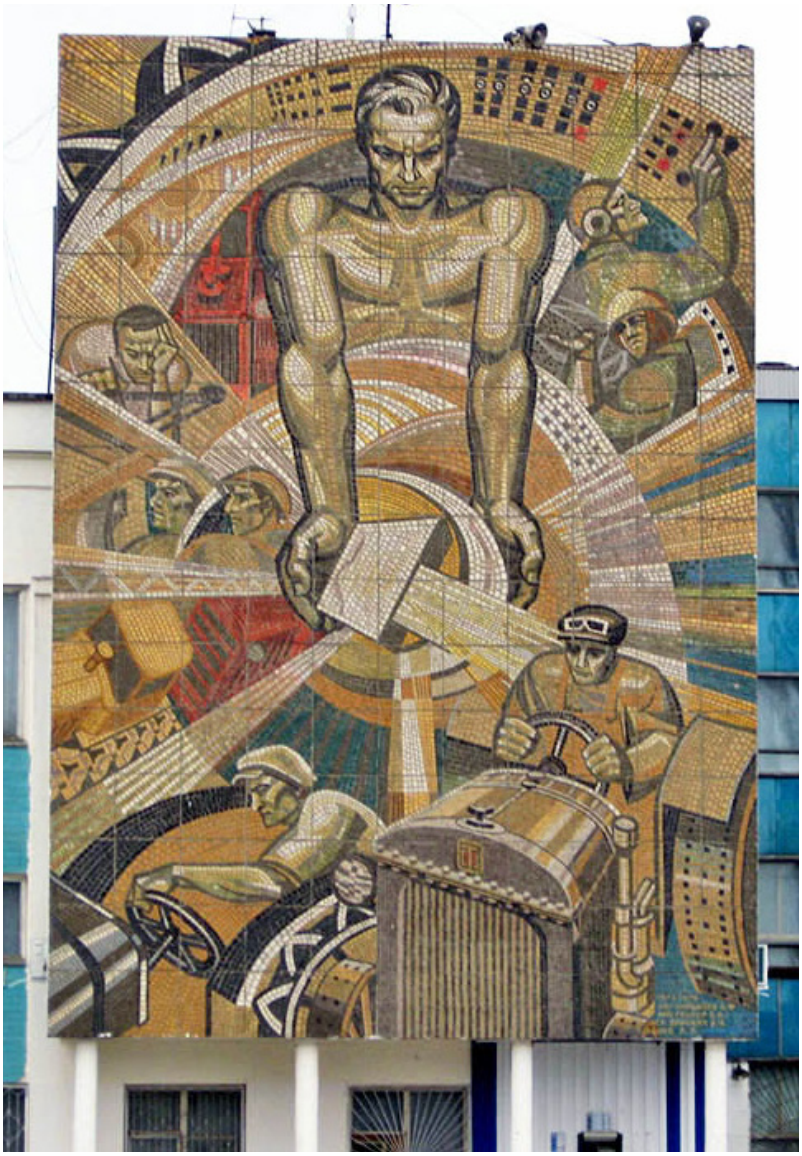
Theme 3 MECHANIZED AND INDUSTRIALIZED AGRICULTURE

Subthemes	Types of Places
• Changing rural landscapes • Agricultural mechanization • Increase in agricultural productivity • Intensive water management and large-scale irrigation • New forms of agricultural processing • New forms of industrial-scale farm production and transportation • Growth of corporate farming • Environmental impacts of agriculture • The Green Revolution • Organic farming and the Slow Food movement • Continuation of subsistence farming	• Irrigation and water management infrastructure • Hydroelectric power stations and rural electrification schemes • Large-scale grain storage • Farm machinery production and storage facilities • Industrial-scale meat and produce production facilities • Industrial-scale food processing and distribution facilities • Agricultural exhibition centers and showgrounds • Monoculture landscapes • Hydroponic and aquaculture farms • Wind and solar farms

▲

Figure 3.1. Bhakra Dam, 1963, Bilaspur, Himachal Pradesh, India. At 226 meters (741 feet) in height, this concrete gravity dam is the tallest in India and among the tallest in the world. It dams the Satluj River to create India's third-largest reservoir, holding excess waters during the monsoon and providing regulated release throughout the year. The dam feeds the Bhakra Canal, which provides irrigation to ten million acres of fields in Punjab, Haryana, and Rajasthan. Electric power produced by the dam's generators is distributed to Himachal Pradesh and five neighboring states.

Photo: 2008, Kawal Singh, Wikimedia Commons, public domain.



Figures 3.2a, 3.2b. Volgograd (formerly Stalingrad) tractor plant, 1930 (rebuilt post-WWII), Volgograd, Russia. The tractor transformed farming practices by drastically reducing the need for human and animal labor and expanding the size of farming operations. The neoclassical entrance to the Volgograd tractor plant (above), the first giant tractor factory in the USSR, reflects the elevated role of mechanized agriculture within the early Soviet Union. A large-scale mosaic (right) adorning the main facade celebrates the role of machinery alongside collectivist themes: the centralized role of government, industriousness, and equality within the group.

Photos: (3.2a) 2011, Redboston, courtesy Wikimedia Commons, CC BY-SA-3.0; (3.2b) 2008, nordprod, courtesy Wikimedia Commons, public domain.

Figure 3.3. Canada Malting Silos (abandoned), 1905, Montreal, Quebec, Canada. These silos stored barley used to produce malt at the adjacent factory. It is located on the Lachine Canal, which connected to the Great Lakes in what was then the largest industrial district in Canada. Such grain storage facilities were common sights along waterways or rail lines in grain producing regions, but as transport modes shifted, the factory became functionally and economically obsolete. Operations ceased in 1985, several decades after the adjacent canal was closed to shipping.

Photo: 2012, 123bfran, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 3.4. Shanghai Municipal Abattoir, 1933, Shanghai, China. Large public abattoirs were centralized facilities for the containment and slaughter of animals and the processing and cold storage of meat. The "model" abattoir relied on maintaining mechanization and production-line principles for efficient slaughter and storage. Shanghai Municipal used a labyrinthine series of narrowing ramps and bridges to guide livestock through the process. Railway lines and a large central market were in close proximity for shipping and selling the finished product.

Photo: 2009, Carsten Ullrich, courtesy Wikimedia Commons, CC BY-2.0.

Figure 3.5. Milking parlor, ca. 1986, Grosserkmannsdorf, Germany. With the introduction of the Rotolactor in 1930 in the US, large numbers of cows could be milked successively and automatically, meaning faster milking times, higher yields, and less human labor. Such rotary milking parlors represented a more hygienic form of dairy production, as neither human hands nor air came into contact with the milk. In the East German Republic of the mid-1980s, farming collectives (known as LPG Tierproduktion) that could afford the investment began testing automated systems like the one pictured here. Rural electrification and refrigeration were key aspects of the success of such means of production.

Photo: 2008, Gunnar Richter, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 3.6. Strawn Citrus Packing House District, 1921, De Leon Springs, Florida, USA. The modern fruit packing plant, with its automated system of conveyer belts and pulleys, allowed for movement of large volumes of produce. Close proximity to railway lines and, later, highways meant produce could be shipped long distances quickly. However, reliance on high yields of single crops left orange growers, like other farmers, vulnerable to a host of conditions. In 1983, the Theodore Strawn Company (also known as the Bob White packinghouse) collapsed after an unexpected freeze decimated its orange groves.

Photo: 2009, MrX, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 3.7. 4-H Building, Minnesota State Fairgrounds, 1939–40, St. Paul, Minnesota, USA. Agricultural exhibition halls and fairgrounds were used to promote the latest and best practices in agricultural achievement, from new technologies to prized livestock and produce. In the US, annual state fairs were popular competitive and recreational gatherings held at permanent locations in purpose-built structures. This streamlined concrete building, funded through the Works Progress Administration, housed activities of the 4-H Club, which gave rural youth hands-on experience in farming and farm homemaking skills. Though 4-H has since broadened its mandate, the building continues to serve members.

Photo: 2018, Tony Webster, courtesy Wikimedia Commons, CC BY 2.0.

Figure 3.8. Doka Estate coffee plantation, ca. 1940, Alajuela, Costa Rica. Coffee is one of the major cash crops and leading exports of Costa Rica, where coffee plantations focus on all aspects of production of that single crop. Doka Estate, one of the country's largest coffee plantations, has been operated by three generations of the same family. Like many historic coffee plantations in Costa Rica and other countries, it generates income, an understanding of coffee production, and interest in Doka's products by offering tours to the public.

Photo: undated, Kevin Casper, courtesy PublicDomain Pictures.Net, CC0 1.0.

Figure 3.9. Haller Park fish farm, 1980, Mombasa, Kenya. Fish farming, or aquaculture, involves raising fish commercially in enclosures such as ponds or tanks, as shown here. This tilapia farm was established in 1980 and today produces thirty to thirty-five tons of fish each year. It is a result of the efforts of the Bamburi Cement Company to transform the barren landscape of its disused limestone quarries into a reforested area and create a new economic opportunity.

Photo: 2009, Mark Boulton/Alamy Stock Photo.

NOTES

1. Food and Agriculture Organization of the United Nations (FAO), *The State of Food and Agriculture 2000: Lessons from the Past Fifty Years* (Rome: FAO, 2000), 226, table 14.
2. *Encyclopedia Britannica*, s.v. "Origins of Agriculture: The Tractor," by Wayne D. Rasmussen et al., last modified February 4, 2020, https://www.britannica.com/topic/agriculture/Scientific-agriculture-the-20th-century#ref10679; and National Academy of Sciences, "Agricultural Mechanization Timeline," Greatest Engineering Achievements of the 20th Century, accessed March 2, 2020, http://greatachievements.org/?id=3725.
3. J. R. McNeill, *Something New under the Sun: An Environmental History of the Twentieth-Century World* (New York: W. W. Norton, 2000), 216–17.
4. P. E. Dewey, *British Agriculture in the First World War* (London: Routledge, 1989), 150.
5. FAO, *State of Food and Agriculture*, 179.
6. George Constable and Bob Somerville, "Agricultural Mechanization," in *A Century of Innovation: Twenty Engineering Achievements That Transformed Our Lives* (Washington, DC: Joseph Henry Press, 2003), 73–80; see also National Academy of Sciences, "Agricultural Mechanization Timeline."
7. "Access to Electricity, Rural (% of Rural Population)," World Bank Open Data, accessed March 2, 2020, https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS.
8. Nick van de Giesen, "A Brief History of 20th Century Dam Construction and a Look into the Future" (paper presented at EGU General Assembly 2010, Vienna, Austria, May 2–7, 2010), https://ui.adsabs.harvard.edu/abs/2010EGUGA..12.2185V/abstract.
9. Bryan Tilt, Yvonne Braun, and Daming He, "Social Impacts of Large Dam Projects: A Comparison of International Case Studies and Implications for Best Practice," *Journal of Environmental Management* 90, suppl. 3 (July 2009): S249–S257.
10. "History of Commercial Egg Production," American Egg Board, accessed March 2, 2020, https://www.aeb.org/farmers-and-marketers/history-of-egg-production.
11. G. Raghuram, "An Overview of the Trucking Sector in India: Significance and Structure," Indian Institute of Management Ahmedabad Working Papers Series 2015-12-02 (Ahmedabad: Indian Institute of Management Ahmedabad, 2015), 4, https://web.iima.ac.in/assets/snippets/workingpaperpdf/12319057932015-12-02.pdf.
12. Raghuram, 3–6.
13. "Freight Facts and Figures: Employment in For-Hire Transportation Establishments Primarily Serving Freight," US Department of Transportation, Bureau of Transportation Statistics, accessed March 2, 2020, https://data.transportation.gov/stories/s/Freight-Transportation-the-Economy/6ix2-c8dn.
14. *Encyclopedia Britannica*, s.v. "Agricultural Economics," by D. Gale Johnson, last modified January 16, 2019, https://www.britannica.com/topic/agricultural-economics.
15. *Encyclopedia Britannica*, "Agricultural Economics."
16. Viktor Danilov, "The Issue of Alternatives and History of the Collectivization of Soviet Agriculture," *Journal of Historical Sociology* 2, no. 1 (March 1989): 1–13.
17. Peter Nolan, "Collectivization in China: Some Comparisons with the USSR," *Journal of Peasant Studies* 3, no. 2 (1976): 192–220.
18. Roy L. Prosterman, "Land Reform," in *International Encyclopedia of the Social Sciences*, ed. William A. Darity Jr., vol. 4, 2nd ed. (Farmington Hills, MI: Macmillan Reference USA, 2008), 343. Accessible on Encyclopedia.com, last modified February 20, 2020, https://www.encyclopedia.com/history/ancient-greece-and-rome/ancient-history-rome/agrarian-reform#3045301297.
19. Prosterman, 342.
20. McNeill, *Something New under the Sun*, 219.
21. McNeill, 223–24.
22. G. H. McClellan and S. J. Van Kauwenbergh, "World Phosphate Rock Production," in *Use of Phosphate Rocks for Sustainable Agriculture*, ed. F. Zapata and R. N. Roy. FAO Fertilizer and Plant Nutrition Bulletin 13 (Rome: Food and Agricultural Organization of the United Nations, 2004), http://www.fao.org/3/y5053e/y5053e07.htm#bm07.1.
23. David Pimentel and Hugh Lehman, eds., *The Pesticide Question: Environment, Economics, and Ethics* (New York: Chapman and Hall, 1993).

24. Tim Harford, "How Rudolf Diesel's Engine Changed the World," *BBC News*, December 19, 2016, https://www.bbc.com/news/business-38302874; and "History of Biofuels," Biofuel.org.uk, accessed March 2, 2020, http://biofuel.org.uk/history-of-biofuels.html.

25. Randy Schnepf, *Agriculture-Based Biofuels: Overview and Emerging Issues*, CRS Report R41282 (Washington, DC: Congressional Research Service, 2013), 2–3, https://fas.org/sgp/crs/misc/R41282.pdf; Luís A. B. Cortez et al., "40 Years of the Brazilian Ethanol Program (Proálcool): Relevant Public Policies and Events throughout Its Trajectory and Future Perspectives" (paper presented at 22nd International Symposium on Alcohol Fuels, Cartagena, Colombia, March 2016), http://bioenfapesp.org/gsb/lacaf/documents/papers/05_ISAF_2016_Cortez_et_al.pdf; and "South America," Biofuel.org.uk, accessed March 2, 2020, http://biofuel.org.uk/south-america.html.

26. Herminio R. Rabanal, *History of Aquaculture*, ASEAN/SF/88/Tech. 7 (Manila: ASEAN/UNDP/FAO Regional Small-Scale Coastal Fisheries Development Project, 1988), http://www.fao.org/3/ag158e/AG158E01.htm#ref1.2; "History of Hydroponics," University of Arizona, College of Agriculture and Life Sciences, accessed March 2, 2020, https://cals.arizona.edu/hydroponictomatoes/history.htm; and "Hydroponics," in *The Gale Encyclopedia of Science*, ed. K. Lee Lerner and Brenda Wilmoth Lerner, vol. 4 (Farmington Hills, MI: Gale, 2014), 2271–72.

27. Douglas L. Karlen and Charles W. Rice, "Soil Degradation: Will Humankind Ever Learn?," *Sustainability* 7, no. 9 (2015): 12495–96, https://www.mdpi.com/2071-1050/7/9/12490.

28. "Our History," Slow Food, accessed March 2, 2020, https://www.slowfood.com/about-us/our-history/.

29. George Kuepper, *A Brief Overview of the History and Philosophy of Organic Agriculture* (Poteau, OK: Kerr Center for Sustainable Agriculture, 2010), https://kerrcenter.com/publication/brief-overview-history-philosophy-organic-agriculture/; and "The History of Organic Farming," OrganicNet, last modified August 30, 2016, https://www.organicnet.co/en/magazine/the-history-of-organic-farming.

Theme 4

World Trade and Global Corporations

Growth in the globalization of trade led to significant changes in political power structures and cultural landscapes around the world over the course of the twentieth century. Five major trends in world trade that emerged during this period are discussed in this essay.

In the first of these trends, international trading relationships shifted dramatically following the decline of colonial power structures, especially after World War II (WWII), when bilateral and multilateral trading blocs arose in the context of diverse political and economic priorities. The second trend involved the economic ascendancy of Japan, China, and other East Asian nations, when increased foreign investments led to significant effects on labor, consumption, and other issues both within these countries and worldwide. Third, the rise of multinational corporations and global franchises spread the influence and physical presence of these entities far beyond their home countries. This, in turn, fueled the fourth trend: changes in ships, ports, and how goods were transported by sea, which profoundly impacted port cities and the buildings and landscapes associated with them. The final trend involved global change in the import and export of energy sources, accelerating world economic growth.

International Trading Relationships and Trading Blocs

At the start of the twentieth century, most large companies operated primarily within national borders, except those where the import and/or export of goods, equipment, and raw materials was central to their business. British, German, Dutch, Spanish, French, and Portuguese companies often imported and exported within their respective empires, engaging in economic colonialism whereby preferential trading arrangements were designed to benefit the imperial host country. However, in the second half of the century, global trade linked to large corporations operated under fundamentally different conditions, influenced by either bilateral or multilateral trading blocs and maneuvering within diverse political tensions. These included decolonization and the Cold War, which pitted capitalism against socialism and communism.

Before the outbreak of World War I, Great Britain, France, Germany, and the US, along with Spain, Portugal, and the Netherlands, maintained economic dominance over a number of less powerful countries.[1] Even after gaining independence, these former colonies and protectorates often continued their historical trading relationships. The onetime British colonies of Hong Kong and Singapore, for instance, thrived in a postcolonial world in which the movement of capital became as important as the transport of goods.

The two world wars fundamentally changed these patterns. Trade was disrupted, human casualties were immense, and whole cities and industries needed to rebuild after suffering massive damage from bombing. The economies of Britain, Germany, Japan, and the USSR—four of the world's largest—were crippled by WWII (for more on global wars, see theme 10). The US, which suffered casualties but no bombing damage aside from the events at Pearl Harbor, grew stronger due to its vast domestic economy and a relatively high degree of self-sufficiency in both agriculture and manufacturing. As the war wound down, the US was able to turn quickly from military to civilian production.

Most countries imposed import duties and extra tariffs on goods manufactured beyond their boundaries unless they were part of an imperial trading bloc. Before and after the Great Depression of the 1930s, tariffs were used to encourage and protect fledgling or declining local industries and were commonly applied to imported consumer goods and agricultural produce. Traditional products, including clothes, shoes, and household crockery, continued to be produced in smaller plants until mass production and changes in global trade overtook them.

Russia, which became a communist nation after its 1917 revolution, joined with five other nations in 1922 to form the Union of Soviet Socialist Republics, a political and economic bloc that eventually grew to fifteen in number. The natural and technological resources of the countries in the USSR's sphere of influence were sufficient to create a "closed" system of trading between Eastern bloc countries. Decisions on the development of new products and the location of new industrial plants and settlements were often made for political reasons rather than for economic efficiency. In the economy that emerged, the state controlled both the means and location of production and most aspects of consumption. The notion of competitive commercial firms—central to Western-style capitalism—was explicitly rejected in favor of the state directing all aspects of the economy, combining manufacturing expertise with a wide array of natural resources.[2] In the 1950s, a number of newly independent nations, reluctant to align with either bloc, came together to form the Non-Aligned Movement (for more on evolving political ideologies, see theme 6).

WWII resulted in the establishment not only of new world political bodies, such as the United Nations, but also of institutions that managed the multilateral trading system. Notable among these was the General Agreement on Tariffs and Trade (GATT), which went into effect in 1948 and evolved into the World Trade Organization in 1995. Agreements such as GATT impacted local manufacturing, rendering industrial areas and associated transportation networks redundant and in need of repurposing.

New strategic trade and economic cooperation agreements grew from these multinational trading systems. The most comprehensive of all the trading blocs, the European Economic Community, founded in 1957 and renamed the European Community in 1993, became the principal component of the European Union when it was established in 1993. Initially composed of twelve member states,

this new kind of trading bloc went beyond cutting traditional tariffs to create a common currency and embrace the free movement of people and capital within its borders. As a result, border control sites and offices throughout Europe suddenly became redundant. Formerly protected national industries and agricultural production were forced to restructure or attract subsidies to remain operationally competitive. Colonial trading partners that had created secure economies by supplying goods to the UK—from dairies in New Zealand to apple growers in Tasmania—lost their markets, and once-productive landscapes and their associated infrastructure were rendered superfluous.

The Expansion of Asian Economies

After WWII, the Japanese economy rebounded quickly. From the mid-1950s to the early 1970s, exports and domestic consumption skyrocketed.[3] By the 1960s, "the structure of the Japanese economy changed to concentrate on high-quality and high-technology products designed for domestic and foreign consumption."[4] The country sought new, stable, economically advanced trading partners. Improvements in shipping methods made it possible for the island nation to efficiently export goods. These shifts in manufacturing and transportation meant that "the face of rural Japan changed, with hard-surfaced roads, concrete schools, factories, and sales outlets for automobiles and farm equipment replacing the once timeless thatched-roof houses" and small-scale settlements.[5]

China's economic reemergence began in the late 1970s and expanded vigorously throughout the 1980s and 1990s. In 1979, Chinese Communist Party leader Deng Xiaoping initiated his "open door policy" of limited experimentation with capitalism, followed a year later by the creation of four "special economic zones" in southern China. This brought massive redevelopment of the country's infrastructure and industrial landscapes in addition to intensive urban development. The large-scale changes correlated with a decline in areas of rural China and in traditional manufacturing centers in other countries.[6]

Concurrent with the rapid economic expansion in Japan and China, the "Four Asian Tiger economies" of Taiwan, Hong Kong, Singapore, and South Korea also mushroomed, and their economic growth exceeded 7 percent from the 1960s to the 1990s.[7] Indonesia, Malaysia, the Philippines, Thailand, and Vietnam—sometimes called "tiger cub economies"—experienced similar expansions due to export-driven policies. The wealth they generated also altered the physical landscapes of these expanding nations, as urbanization intensified, new factories and housing were erected, and new kinds of port infrastructure were developed. Important effects, economically and otherwise, were similarly felt on places farther afield.

The foreign influence of large business conglomerates was effectively adopted and used as a business model for international expansion. By the late twentieth century, it was a model favored by both capitalist economies and centrally controlled economies such as China. Malaysia and other countries joined China in creating "special economic zones," which incentivized investments from Europe, North America, and other entities in Asia to create large factories in places where cheap labor was available.

The Growth of Multinational Corporations and Global Franchises

The burgeoning power of capitalist corporations that operated in one or more locations outside of their home countries was one of the most significant changes to entrepreneurial activity and corporate structures in the twentieth century. These multinational and transnational companies established plants in countries where costs of production—labor, energy, transport—were cheaper than in their home countries, often resulting in large areas of redundant manufacturing facilities and associated transportation infrastructure. Countries with large domestic markets could readily expand to exporting goods, which the US, Japan, Italy, and Germany successfully accomplished with motor vehicles, electrical appliances, computers, and telecommunications systems. By the 1980s, an increasing number of Asian countries also were manufacturing vehicles and computer products in newly built plants and cities.

According to the Fortune Global 500, in 1995 nine of the twelve largest companies in the world (measured by revenue) were involved primarily in manufacturing, and all had plants in multiple countries.[8] This was especially true of car and truck manufacturers, as export costs for these large items were relatively high until roll-on/roll-off shipping—in which vehicles are rolled, rather than lifted, onto ships—became more widely implemented. Oil companies such as ExxonMobil (no. 8 on the Fortune list) and Royal Dutch Shell (no. 10) sourced petroleum from around the globe and sold their products worldwide through tens of thousands of branded petrol/gas stations. The only retailer to make Fortune's top twelve was US-based Walmart (no. 12), which began its international expansion in 1994 with the purchase of 122 Woolco stores in Canada. By the turn of the century, Walmart had moved to the no. 2 position on the Global 500.[9]

In the context of the alliances and blocs that proliferated after WWII, within regions where capitalism flourished, corporate franchising expanded. Although the idea of one company (the franchisor) allowing its brand to be used by partners (the franchisees) predates the twentieth century, franchising as a successful corporate strategy became much more prevalent after the 1950s, when fast-food restaurants, hotels and motels, pharmacies, department stores, and other, similar businesses adopted this arrangement for greater profit and international visibility.[10]

Changing Port Landscapes

At the dawn of the twentieth century, ships berthed at wharves, usually in harbors or along rivers. Most of these wharves were built of wood, sometimes with steel framing. In busier ports, hundreds of vessels might simultaneously be berthed or waiting at anchor. The world's largest ports were near city centers: London (England), Kobe and Yokohama (Japan), Hong Kong (a British Crown Colony until 1997) , Hamburg (Germany), and New York (US) in the Northern Hemisphere, and Jakarta (Indonesia), Durban (South Africa), and Santos (Brazil) in the Southern Hemisphere. Rail access was used at many ports to transport both exports and imports to and from the docks. The loading and unloading of ships was labor intensive. Though many ships had their own cranes, much of the work was manual, performed by sailors and dock laborers who came from all parts of the world.[11]

Ports were supported by a combination of government planning and investment with private finance from shipping companies; from the global insurance industry, which underwrote the import and export of goods; and from other investors. The construction of new maritime links, such as the Suez Canal (opened 1869) and Panama Canal (1914), despite requiring complex international arrangements between governments and investors, improved shipping routes and facilitated an increase in global trade.

With enhancements to the design of bulk carriers, the export of petroleum products and minerals, along with iron ore and bauxite, rose exponentially after WWII. Off-loading facilities and massive bulk terminals were built at or near ports. In addition, the development of diesel engines powerful enough to propel tankers—ships that carried liquid or gases in bulk—allowed the construction of larger vessels. In 1956, the introduction of the container ship revolutionized the import and export of goods. Cargo could now be efficiently transported in stackable, standardized, modular steel containers that were hoisted on and off ship by cranes. Containerization led to a highly automated process of transporting goods that dramatically reduced the amount of time ships spent in port, increased the volume of cargo that could be transported, and minimized the costs of doing so.[12]

Expansion of major world ports soon followed; some were relocated from their original sites to be closer to the ocean. New ports were built where none had existed before. Older ports that simply couldn't cope with the size of the new ships and containerization were rendered obsolete. Modernization necessitated the deepening of harbors, and facilities were reconfigured to accommodate container ships. In 1962, the world's first container port, the Elizabeth Marine Terminal, opened in New Jersey. Cranes at modern ports also grew in size. In 1967, the mobile gantry crane was invented in Finland, followed twenty years later by the rubber-tired gantry crane.[13] Covered piers and storage sheds that once protected cargo from weather and theft were replaced with large, open spaces to accommodate the trucks that hauled containers to and from the ships.[14]

The largest economies exported manufactured goods; the US, Japan, and Germany were the three largest merchandise exporters in 1992.[15] Export-oriented economies also moved foodstuffs, including products ready for sale (wine, canned vegetables, dried fruits, coffee, tea, and so forth) and bulk exports (including sugar, wheat, and maize). Fresh meat, fish, dairy, and produce were handled by refrigerated transport. Initially, energy/production exports (coal, oil, iron ore, bauxite) were usually exported raw and converted in the destination country. Many countries built oil refineries to handle imported crude, but by the end of the century some smaller refineries had closed in favor of importing already refined petroleum products in bulk carriers.

By the late 1990s, China had become one of the world's largest manufacturers and the largest importer and exporter; in 2000, China was moving forty-one million standard twenty-foot containers, compared to twenty-eight million for the US, seventeen million for Singapore, thirteen million for Japan, and nine million for Korea.[16]

The increase in shipping volumes created potential environmental hazards on a previously unimaginable scale, most notably involving massive oil spills from tankers. These ships were so large and so difficult to maneuver that natural features such as coral reefs could be damaged by a bulk carrier or large container ship unable to stay within the designated shipping lanes. Dredging of harbors and channels caused further environmental risks and damage.

At century's end, many redundant port areas were being redeveloped for recreational and commercial uses once the shipping businesses relocated. The outcome gave rise to beautiful waterfront promenades and repurposed wharf and warehouse districts (for more on conserving cultural heritage, see theme 7).

Energy Import and Export

The twentieth century saw two striking transitions in the production and transport of energy: coal power to oil-based power, and carbon-based energy (including natural gas) to nuclear energy, accompanied by other sustainable and renewable energy sources such as wind and solar power. Coal-fired locomotives and ships continued to operate into the 1950s and later in some places. The diesel engine, invented in the 1890s, began to transform railways in the 1950s and shipping in the 1960s.[17] Diesel-powered locomotives and ships no longer needed to carry a supply of coal and could travel longer distances before refueling. Shipping and rail transport costs fell. By the late 1960s, steam turbines in ships had been largely replaced with huge diesel engines powerful enough to propel cargo ships of ever-increasing size.[18]

Although the use of coal, natural gas, and oil-based energy sources continued to grow, by 1960 nuclear energy was becoming more prevalent. The US, Canada, France, and the USSR were concurrently working on different kinds of reactors. These were marketed worldwide until the early 1980s, when the industry began a period of stagnation, partly in the face of public opposition. Nonetheless, during the final third of the twentieth century, energy from nuclear reactors accounted for about 16 percent of the world's energy output.[19] However, meltdowns and the disposal of radioactive waste remained a major concern. By century's end, the development of renewable energy sources from non-fossil fuels—wind, solar, and other sources—was becoming increasingly popular (for more on development of new energy sources, see theme 2).[20]

In the wake of this transition, coal-fired power stations were rendered increasingly obsolete. Imports and exports were also affected, as well as the range of products produced. Oil not only provided lubrication and propulsion but also proved central to the development of pesticides and plastics. Plastics created new export industries and reduced the weight of a wide variety of goods, from refrigerators to motor vehicles.[21] (See also theme 2.)

Photo Gallery

The table below lists a selection of subthemes and types of places related to theme 4 and is excerpted from "Twentieth-Century Themes, Subthemes, and the Places That Exemplify Them" (see pp. 10–15). It is followed by a gallery of photos showing a diverse range of buildings, sites, structures, and landscapes from around the world that exemplify the issues and subthemes discussed. The text accompanying each photo explains how that place represents the theme of the preceding essay. Some of these places may already be listed as heritage places (from local inventories to the World Heritage List) while others are not, though they *may* be identified as significant in the future. Some are specifically mentioned in the text; many are not. All are included here as exemplars to prompt broad exploration of potential heritage places.

Theme 4 WORLD TRADE AND GLOBAL CORPORATIONS

Subthemes	Types of Places
• Decline of economic colonialism • Rise of bilateral and multilateral trading blocs and international trade agreements • Expansion of Asian economies • Rise of multinational corporations and global franchises • Changing port landscapes and the impact of containerization • Internationalization of trade and manufacturing • Expansion of energy import and export	• Massive industrial plants • International manufacturing plants and distribution outlets • Redundant manufacturing facilities and associated transportation systems • Corporate and organizational headquarters and office buildings • Global franchises, such as retail, dining, and hotel • Port facilities, including obsolete ports • Container ports • Oil extraction systems and refineries • Energy production and storage facilities

Figure 4.1. Fiat Tagliero, 1938, Asmara, Eritrea. This art deco–style petrol station was designed by Italian engineer Giuseppe Pettazzi in the 1930s, when Italy was expanding its colonialist enterprises in Africa. During this period, Italian car company Fiat built facilities in Ethiopia and Eritrea. The reinforced-concrete structure resembles an airplane, its central tower flanked by two fifteen-meter- (forty-nine-foot-) long cantilevered "wings." It is one of several buildings erected by Italian colonists in Asmara, portions of which were inscribed on the World Heritage List in 2017.

Photo: 2015, Sailko, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 4.2. Ford Motor Company power plant (abandoned), ca. 1929, Fordlandia, Brazil. Seeking a source of rubber for use in auto manufacturing, American industrialist Henry Ford established Fordlandia in the Amazon rainforest in 1928. Envisioned as an idyllic company town for the Brazilians employed by Ford, it was intended as both a social and industrial experiment. Poor business decisions, including lack of expertise in growing rubber, combined with unwelcomed attempts to impose American cultural norms and corporate culture on local workers, doomed the project to failure. By the late 1930s, Ford had largely abandoned the town, pulling out completely in 1945 and selling the land back to the Brazilian government at a great loss.

Photo: 2010, Amit Evron, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 4.3. Renault Distribution Center, 1982, Swindon, England. During the 1970s, the French car company Renault Group began expanding globally. Designed by Manchester-born architect Norman Foster in the British High-Tech manner, this highly innovative industrial facility incorporated new materials, technology, and design solutions that allowed for interior flexibility and expansion. Renault moved out in 2001, and the structure is now known as the Spectrum Building.

Photo: 2014, Harry_NL, courtesy Flickr, CC BY-NC-SA-2.0.

Figure 4.4. Montedison plant (abandoned), 1930s–1980s, Crotone, Italy. This enormous former industrial site was once operated by Montedison, Italy's biggest industrial chemical corporation. It is located close to the industrial port of Crotone, which in the mid-twentieth century was one of the busiest in the Mediterranean. By the end of the century, however, both the plant and the port faltered due to the latter's inability to adapt to containerization and the changing international market for chemicals.
Photo: 2016, ©Jeff Cody.

Figure 4.5. Trafford Park Industrial Estate, 1900s–1970s, Manchester, England. Trafford Park began its industrial life in the early 1900s as a manufacturing zone. By the 1930s, it had attracted large numbers of foreign companies (including three hundred American companies alone). By the 1960s and 1970s, manufacturing nearly ceased due to the decline of the Manchester Ship Canal and the closure of the Port of Manchester. The site sprung back to life in the 1980s following the construction of highways linking it to shipping terminals with direct access to Europe.
Photo: 2008, brinkstock / Alamy Stock Photo.

Figure 4.6. Dubai World Trade Centre Tower, 1979, Dubai, United Arab Emirates (UAE). This thirty-nine-story tower provided office space for the first multinational companies and foreign consulates to locate in Dubai. Also known as Sheikh Rashid Tower, it is now part of an expanded complex that includes a large conference and exhibition center. As Dubai's first skyscraper and for decades the tallest building in the UAE, the tower represented the emirates' growing ambitions. It was designed by British architect John Harris, who also conceived the master plan that guided Dubai's transformation from fishing village to modern city, triggered by the discovery of oil in the region in the 1960s.
Photo: 2013, arabianEye FZ LLC / Alamy Stock Photo.

Figure 4.7. McDonald's, 1953, Downey, California, USA. Located in Los Angeles County, the oldest operating McDonald's restaurant still sports the iconic original red-and-white tile facade and golden arches motif. Using an assembly-line method of preparing reasonably priced hamburgers in a clean suburban setting, McDonald's expanded throughout the US and beyond in the second half of the twentieth century. By 2000, the popular franchise operated nearly 27,000 restaurants in 119 countries. McDonald's epitomizes how local retail operations could expand into global franchises with almost universal recognition.

Photo: 2014, Northwalker, courtesy Wikimedia Commons, CC0 1.0.

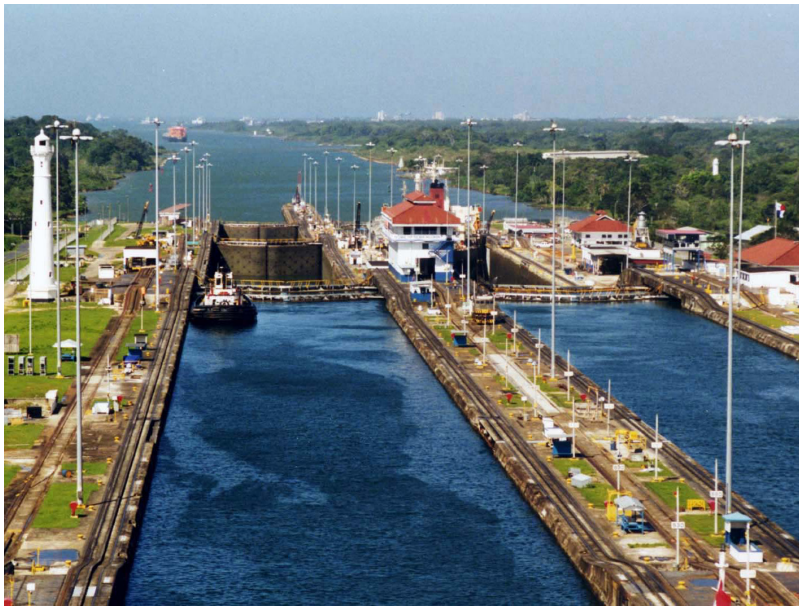


Figure 4.8. Gatún Locks, Panama Canal, ca. 1913, Panama. In 1881, France began building a canal across the Isthmus of Panama. The US took over in 1904, constructing a series of locks along an eighty-two kilometer (fifty-mile) stretch to create a water link between the Atlantic and Pacific Oceans. The project also involved construction of many ancillary structures related to the canal's maintenance. Opened to traffic in 1914, the Panama Canal served as a major conduit for global trade and transportation throughout the century. In 1999, control of the canal was transferred from the US to Panama.

Stan Shebs, 2000, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 4.9. Durban Container Terminal, 1977, Durban, South Africa. The Port of Durban, a natural harbor, has been a vital port of call since the 1840s and is now one of Africa's busiest ports. This container terminal is located on some of the world's busiest trade routes. With excellent rail and road links, the port plays an important role in South Africa's economy. It also reflects the implications of containerization in late twentieth-century ports.

Photo: 2010, Media Club, courtesy Wikimedia Commons, CC BY-SA 2.0.

Figure 4.10. Lost Hills Oil Field, 1910, Lost Hills, California, USA. These "pumpjack" structures, associated with oil wells, stand in a rural area of California where, in 1910, a farmer accidentally discovered oil as he was drilling a water well. Soon afterward, Standard Oil Corporation found a number of underground oil pools nearby and proceeded to exploit them for years. This site exemplifies how widespread the search for oil was during the twentieth century, when large multinational companies such as Standard Oil invested in oil extraction, processing, and marketing to incur greater profits from global industrial expansion.

Photo: 2008, Richard Masoner, courtesy Wikimedia Commons, CC BY-SA-2.0.

NOTES

1. James S. Olson et al., eds., *Historical Dictionary of European Imperialism* (New York: Greenwood Press, 1991); Robert Aldrich, *Greater France: A History of French Overseas Expansion* (Basingstoke, UK: Macmillan, 1996); Thomas Pakenham, *The Scramble for Africa, 1876–1912* (New York: Random House, 1991); and Howard Zinn, Mike Konopacki, and Paul Buhle, *A People's History of American Empire: A Graphic Adaptation* (New York: Metropolitan Books, 2008).
2. See Richard Pomfret, *The Age of Equality: The Twentieth Century in Economic Perspective* (Cambridge, MA: Belknap Press of Harvard University Press, 2011), in particular the chapters on the Soviet economic model and the collapse of central planning. See also Alec Nove, *An Economic History of the USSR* (Harmondsworth, UK: Penguin, 1969); and Giovanni Arrighi, *The Long Twentieth Century: Money, Power, and the Origins of Our Times*, 2nd ed. (London: Verso, 2010).
3. *Encyclopedia Britannica*, s.v. "Japan since 1945," last modified January 2, 2020, https://www.britannica.com/place/Japan/Japan-since-1945; and "Ranking of the World's Richest Countries by GDP (1974)," Classora, last modified April 12, 2016, http://en.classora.com/reports/t24369/general/ranking-of-the-worlds-richest-countries-by-gdp?edition=1974&fields.
4. *Encyclopedia Britannica*, s.v. "Japan: Economic Transformation," last modified January 2, 2020, https://www.britannica.com/place/Japan/Economic-transformation.
5. *Encyclopedia Britannica*, "Japan: Economic Transformation."
6. Thomas Farole and Gokhan Akinci, eds., *Special Economic Zones: Progress, Emerging Challenges, and Future Directions* (Washington, DC: World Bank, 2011), http://hdl.handle.net/10986/2341.
7. "Asian Miracle/Tigers," in *Dictionary of Human Geography*, ed. Derek Gregory et al., 5th ed. (Malden, MA: Blackwell, 2009), 38.
8. "Global 500 1995," Fortune Global 500, accessed August 4, 2020, https://fortune.com/global500/1995/. The Fortune Global 500 is an annual ranking of the largest 500 corporations worldwide as measured by total revenue. This ranking scheme first appeared in 1995.
9. "Global 500 2000," Fortune Global 500, accessed August 23, 2019, https://fortune.com/global500/2000/. On Walmart, see "Our History: Timeline," accessed August 23, 2019, https://corporate.walmart.com/our-story/our-history#timeline.
10. Michael H. Seid, "Where It All Began: The Evolution of Franchising," Franchise-Chat, accessed May 17, 2019, http://www.franchise-chat.com/resources/where_it_all_began_the_evolution_of_franchising.htm.
11. Carola Hein, ed., *Port Cities: Dynamic Landscapes and Global Networks* (Abingdon, UK: Routledge, 2011).
12. Marc Levinson, "Container Shipping and the Economy: Stimulating Trade and Transformations Worldwide," *TR News*, no. 246 (September–October 2006): 12.
13. See Marc Levinson, *The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger* (Princeton, NJ: Princeton University Press, 2006).
14. Brian J. Cudahy, "The Containership Revolution: Malcom McLean's 1956 Innovation Goes Global," *TR News*, no. 246 (September–October 2006): 7.
15. Angus Maddison, *Monitoring the World Economy: 1820–1992*, Development Centre Studies (Paris: Organization for Economic Cooperation and Development, 1995), 234–35, table I-1.
16. "Container Port Traffic (TEU: 20 Foot Equivalent Units)," World Bank Open Data, accessed January 9, 2020, https://data.worldbank.org/indicator/IS.SHP.GOOD.TU?view=map&year=2000&year_low_desc=true.
17. Vaclav Smil, *Prime Movers of Globalization: The History and Impact of Diesel Engines and Gas Turbines* (Cambridge, MA: MIT Press, 2010), 59–78.
18. Smil, 112.
19. "Outline History of Nuclear Energy," World Nuclear Association, last modified April 2019, http://www.world-nuclear.org/information-library/current-and-future-generation/outline-history-of-nuclear-energy.aspx.
20. Hannah Ritchie and Max Roser, "Energy," Our World in Data, last modified July 2018, https://ourworldindata.org/energy.
21. Susan Freinkel, *Plastic: A Toxic Love Story* (Boston: Houghton Mifflin Harcourt, 2011).

Theme 5

Transportation Systems and Mass Communications

Early in the twentieth century, the physical movement of people and goods relied primarily on non-motorized transport as well as shipping and rail systems. As the century progressed, trucks, buses, and planes complemented—and increasingly competed with—ships and rail. Ships were the dominant mode of international travel between continents until the 1960s, when air travel began offering much faster trips and considerably lower fares. These systemic changes necessitated the construction of vast networks of roads, highways, and airports, which in turn required a multitude of support operations, such as fueling stations, repair facilities, and traveler accommodations.

For much of the world at the beginning of the twentieth century, mass communication was carried out through printed matter, but this was rapidly overtaken by newer technologies linked to the telephone and electricity. Many people who had once relied on the postal service, newspapers, or the telegraph as primary sources of information increasingly turned to emerging forms of telecommunications: telephone, radio, and, later, television. By the end of the century, digital technologies made possible by the computer and the internet had transformed mass communication and access to information once again.

Transportation Systems: Advances in Long-Distance Travel

Passenger ships, railways, and other older modes of long-distance transport continued to increase in speed and efficiency during the twentieth century. Ultimately, however, their dominance was supplanted by more modern technologies and developments, including buses, trucks, air travel, and high-speed trains.

RAILWAYS

The railway, which spread across many a countryside in the latter half of the nineteenth century, moved both freight and people more quickly and usually more reliably than water or horse-drawn

vehicles could. Railway links from port cities that had been built up over many centuries enabled them to become even more dominant in the hierarchy of transport provision. In 1900, the world's largest cities were often located near the ocean or another large body of water or waterway. The new lines connected and serviced agricultural and manufacturing areas, benefiting inland cities and regional centers. Many early railway systems started as private enterprises, but by the mid-twentieth century most were state owned or state subsidized, as they often crossed either national borders or, in federal systems, state or provincial boundaries. Huge railway terminus stations were built to cater to both freight and passengers; many of the largest rose up between the 1880s and the 1930s.

As railways spread out from cities, smaller train stations (and their ancillary maintenance structures) proliferated throughout the countryside. Social mobility increased, settlement patterns changed, and new employment, education, and leisure options emerged. Advances in civil engineering, combined with the evolution in concrete technology, aided the construction of rail routes that improved service and accessibility. It also made possible the erection of enormous bridges that spanned entire valleys and maximized travel time, and the expansion of rail lines to access more remote areas. Transcontinental railways, constructed in North America during the nineteenth century, subsequently began appearing in other parts of the world. In Eurasia, the Trans-Siberian was completed in 1904; the Trans-Australian commenced service in 1917; and the Benguela Railway, which debuted in 1929, extends across Angola into what is now the Democratic Republic of the Congo. These were celebrated as some of the greatest technological advances of the century. By the 1950s, electric and diesel locomotives had significantly reduced travel times on many lines.

Rail networks continued to expand until the 1950s, when shrinking rural populations—brought about by increasingly mechanized agriculture and the rise of both air and road transportation options—contributed to the decline, consolidation, and closure of miles of railway infrastructure around the world.[1] At the end of the twentieth century, the four largest railway systems by route length were in the US, Russia, India, and China.[2] Britain, Japan, Italy, and other countries with much smaller landmasses retained their dense networks, maintaining access even to remote rural towns.

Air and automobile travel did have its share of disadvantages in the form of airport delays and road congestion, respectively. The cultivation of new propulsion technologies helped railways compete effectively in this area. In 1964, Japan introduced the Shinkansen, the world's first high-speed passenger train, or bullet train, on the Tokyo-to-Osaka line, and quickly moved to develop the concept for a national network of intercity and commuter routes, heralding Japan's postwar reconstruction and economic recovery efforts. The network was able to transport massive numbers of people and had significant impacts on settlement patterns around Tokyo.[3]

A new era had been launched, and many other countries have since followed suit with their own high-speed rail systems.[4] The advances were not without potential hazards, though. The tracks on which these trains run are usually enclosed by fencing or other protective barriers to reduce the potential for accidents. Noise pollution is a significant factor in land use near high-speed rail lines, including the adaptive reuse of existing buildings.

Tunnels, whether through mountains or underwater, were needed to improve the speed of rail trips. The world's longest undersea railway tunnel, the Channel Tunnel, which runs beneath the English Channel and connects the island of Great Britain with the European continent, opened to passenger and freight traffic in 1994.

From grand to modest in style and decor, railway stations remain among the most evocative structures of the twentieth century. Many of the great railway stations are still in operation. Across Europe and Japan, stations damaged or destroyed during World War II (WWII) were restored or constructed anew. In many places, redundant railroad stations have been repurposed as museums, shopping malls, conference centers, hotels, and the like. Abandoned infrastructure—tracks, embankments, bridges—remained significant features on the landscape. Some of these have been adapted for recreational use, such as parks or walking and cycling trails. A number of famous steam train routes now serve as tourist attractions complete with historic locomotives and carriages, a cultural adaptation that has minimal impact on the historic resource.

TRUCKS AND BUSES

Motor trucks first emerged in the 1890s. Used initially for military purposes, firefighting and other special services, and hauling goods, they became popular for short freight trips. As technological developments made it possible to build larger, more powerful vehicles, trucks eventually challenged the economic value of freight trains, especially when the point of pickup and/or delivery was not directly served by rail.[5] The development of intercity freeways in many nations after WWII meant that the use of large trucks could undercut the cost of rail freight. Even today, however, freight railways—powered mainly by diesel since the 1950s—dominate in hauling heavy goods, particularly raw materials such as coal and iron ore and bulky agricultural products such as wheat.

Motorized buses also first appeared in the 1890s. Their evolution largely paralleled that of trucks because bus bodies were mounted on truck chassis until the 1920s.[6] Buses emerged as one of the main modes of regional travel in the interwar and postwar years, especially for those who did not have access to a car (on urban mass transit and car ownership, see theme 1). When passenger railway services were curtailed, buses usually replaced trains on those routes. They remained the least expensive way to travel, and serviced mountainous or remote areas that were difficult to reach or did not generate sufficient traffic to justify the establishment of train or airline routes. In countries with limited railway systems, including many in Africa, South America, and Asia, buses continued to be the main means of passenger transport, often carrying goods as well as people. In many island communities today, buses and ferries are still the only means of public transport.

PASSENGER SHIPS

With the rapid growth of mass migration in the last half of the nineteenth century, fueled by famine, the discovery of gold, better employment opportunities, and the search for a better life, shipping companies began building larger vessels to keep up with demand. The grandest vessels of the twentieth century were designated for the route from Southampton, England, to New York, New York, not least the ill-fated *Titanic*. Before World War I (WWI), Britain was the world's biggest shipbuilding nation for

naval, passenger, and merchant marine vessels.[7] By the 1990s, Korea, China, and Japan dominated world shipbuilding.[8] Passengers traveling by sea included businesspeople, tourists, and emigrants, as well as former migrants visiting their home countries. In the 1960s, as transoceanic ship travel began to decline with the rise of the jet age, a new industry, cruise tourism, was born and grew rapidly over the remainder of the century.[9]

Vast port facilities catered to the passenger trade. These required different facilities than those for freight (on shipping of goods and containerization, see theme 4): ramps and walkways to move passengers, reception halls to house immigration officials and process thousands of arrivals, and amenities for dining, shopping, and the like. Some facilities from the heyday of migration by ship survive, among the most notable being Ellis Island in New York (in operation from 1892 to 1954), now a national monument and museum of immigration. Today, active passenger ship terminals are subject to ongoing expansion and upgrades to accommodate ever-larger ships and enhanced visitor amenities.

AIR TRAVEL

Until the mid-1960s, it was cheaper to travel by passenger ship than by airplane, especially on longer trips. With the coming of the jet age in the late 1950s, the cost of air travel began to drop. Long-range air travel became more feasible with the introduction of the first jumbo jet, the Boeing 747, which made its initial commercial flight in 1970. Costs of air travel continued to fall especially after the 1980s, as new classes of aircraft were introduced and routes expanded. Airports, once relatively modest installations with short runways, suddenly needed to be expanded not only in runway length but also in terms of passenger- and freight-handling facilities and amenities.[10]

In 1980, nine of the ten busiest airports in the world, measured by passenger volume, were in the US, led by Chicago O'Hare (1949, a former military base); Heathrow, in London, England (1946, formerly a Royal Air Force base), the only non-US airport on the list, was ranked fourth.[11] Twenty years later, five of the ten busiest were in the US, with four in Western Europe; Tokyo Haneda, in Japan, was ranked sixth. Several airports in Asia, including those in Seoul, South Korea; Hong Kong, China; and Singapore, had also become major hubs by the year 2000.[12] Others throughout Asia and the Middle East, such as Dubai International Airport, in the United Arab Emirates, underwent major expansions in the late 1990s. Mega-events such as the annual pilgrimage to Mecca and sporting events including the Olympics and football's World Cup fueled demand for international travel.[13]

Most early airports were built relatively close to city centers, but with urban growth and the call for expansion, some were abandoned or relocated. Hong Kong (1998), Kuala Lumpur, Malaysia (1998), and Osaka, Japan (1994), invested in brand-new international airports located away from city centers and connected by quick rail links. These massive projects involved considerable land reclamation, creating new land and new landscapes. Noise and pollution concerns influenced land use in the immediate vicinity of airports. While such property was generally not favored for residential use, in many places residential districts lay directly under flight paths; some airports in Asia, Africa, and South America abut slum settlements.

Mass Communications: The Evolution of Pre-Twentieth-Century Technologies

Several forms of mass communication that emerged in the nineteenth century or earlier—including postal services, newspapers, the telegraph, and the telephone—persisted into the twentieth century, which was fundamentally shaped by their expansion and technological evolution.

POSTAL SERVICES

The postal services that developed and expanded around the world in previous centuries made their mark on the twentieth century. Thousands of purpose-built post offices and mail processing facilities began dotting the landscape, offering communities far and near a swift means of connecting. In many places, customers collected their mail at personal post office boxes. In others, mail was delivered directly to a home or business address. Postal and telegraph systems in most countries were owned and operated by the government, be it a colonial power or a nation-state. In British colonies, the largest such office in a particular jurisdiction was called the "general post office"; in French colonies, "le PTT." Around the globe, the main post office building in a city or town was often a grand, ornate edifice that offered postal, telegraphic, and telephone services.

Most national postal systems not only handled letters and telegrams but also began expanding their facilities for the sending and receiving of parcels on the growing rail networks in the early twentieth century. Households received illustrated newspapers and letters in the mail. Beginning in the late nineteenth century, all manner of goods—from clothing and household items to furniture and agricultural equipment—could be purchased through mail-order catalogs. By the mid-twentieth century, mail order was a major industry. Smaller parcels might be delivered directly to the consumer, while larger items could be picked up at the nearest railway station. Even a new house could be ordered by catalog: between 1908 and 1940, the giant US catalog retailer, Sears, Roebuck and Co., offered complete kit homes as well as everything needed to furnish them. Parts, plans, and blueprints were shipped by rail. Though Sears was not the only company to manufacture kit homes, it was among the best known, selling an estimated seventy thousand to seventy-five thousand over the years.[14] Mass mail communications, teamed with mass transport systems, spread architectural designs and construction methods across continents.

By the close of the century, personal electronic communications were rapidly outstripping the use of postal services. However, some postal services found a new lease on life with the rise of internet retailing and parcel delivery, led by the launch of e-commerce sites eBay and Amazon in 1995.

NEWSPAPERS

Dating back as early as the seventeenth century, the printed newspaper continued to be the most common form of mass communication. Even small towns had a local newspaper, disseminating general news and deriving revenue from subscriptions and both commercial and classified advertising. Because the latter were often placed in person, major newspapers opened prominent offices and printing establishments in big cities to serve the public. Such commanding headquarters were found even in small towns.

THE TELEGRAPH

The telegraph, the electronic transmission of messages via code, came into commercial use in the first half of the nineteenth century. Telegraphy sat relatively lightly on the ground and required poles and wires; underground cables were used where oceans intervened. The first oceanic cables were installed later in the nineteenth century, and overland and continental telegraph systems arose at roughly the same time. Messages were sent between interconnected telegraph offices in places large and small around the globe. Telegrams, the written or printed form of a message sent by telegraph, continued as a means of long-distance communication well into the twentieth century. Late in the century, however, official telegram services around the world began to close, their demise hastened by the increasing use of email and mobile phones. India's system, the last large telegram service, shut down in 2013.[15]

THE TELEPHONE

The impact of the telephone on life in the twentieth century cannot be underestimated. It brought an immediacy to communication between people, whether for personal, business, or commercial purposes. Changes in the speed and style of customer service and delivery gave rise to entire new businesses. Once service was established in an area, virtually any type of building—residential, commercial, or industrial—could usually be retrofitted with a telephone connection. Public pay phones, also known as phone booths, call boxes, or kiosks, became common features in many places, making phone service available to people who did not have one at home or who were on the move.

This convenient device left its footprint across the twentieth-century landscape in many forms. While telephone company headquarters buildings and public offices might be grand edifices, telephone exchanges, transmission towers, poles, and equipment plants were usually more utilitarian structures. Many of these structures became redundant as wireless, cable, and fiber-optic technology emerged. The introduction of wireless mobile phones in the 1980s brought cell towers to the landscape. As these mobile phones grew in popularity, pay phones became an increasingly rare sight in many parts of the world.

Mass Communications: New Twentieth-Century Technologies

Numerous new communications technologies had a dramatic impact on the twentieth century and beyond. Radio, television, and digital technology can be counted among the most prominent.

RADIO AND TELEVISION

Experiments with wireless transmission began in the mid-nineteenth century. The military started using this technology in the 1890s, and further advances were made during WWI. Wireless transmission evolved into public and commercialized radio broadcasting after 1900. The first purpose-built radio factory opened in England in 1912, and the first radio news program was broadcast in 1920 in Detroit, Michigan. During the 1920s, radio broadcasting became the first electronic mass communication medium, giving both urban and rural residents the ability to hear the latest global and local news and weather warnings, as well as an array of entertainment programs. These programs were initially produced at city and regional recording studios, and local stations developed loyal followers.[16] Successful transmission relied on the reach of the antennae or transmission towers, which became prominent landmarks.

The emergence of television followed on the heels of the first experiments using radio waves to transmit pictures, which were carried out in the early 1920s. The following decade, the first regular television broadcasts were transmitted across England's and Germany's national television services.[17] Commercial, advertising-financed TV transmission arrived in the US in the early 1940s; however, the majority of television stations around the world were publicly or government owned until the 1980s, when more countries began moving toward advertising-supported stations.[18] Television began replacing radio and newspapers as a major source of information and entertainment after midcentury, especially in industrialized nations; through the rest of the century, the vast majority of television sets worldwide were found in Europe (including the USSR) and North America.[19] The development of communication satellites in the early 1960s facilitated television's global reach, as did the launch of subscription television services such as CNN International and BBC World in the late 1980s and early 1990s.

DIGITAL TECHNOLOGY AND THE PERSONAL COMPUTER

Three interrelated but distinctive "revolutions" in computer communications and corporate usage unfolded rapidly between 1968 and 1988, as the shift from mechanical and analog technology to digital electronics marked the dawn of the information age.

First was the "mainframe wave" in about 1968, involving eight US companies that controlled the mainframe market. These highly centralized corporations built specially designed quarters just to house these massive machines. Then, in the late 1970s, the "minicomputer wave" saw networks established that linked one computer terminal to multiple computers. That was followed in the early 1980s by the "internetworking" revolution, which witnessed the creation of large interconnected networks brought on by the introduction of the personal computer.[20] Among developed nations, personal computer use

grew exponentially, not only in commerce and industry but also in schools and private homes. The World Wide Web, invented by British computer scientist Tim Berners-Lee in 1989, would come to offer information access on a previously unimaginable scale.

These major shifts in the ways people communicated in the last decades of the century marked the start of a transformation in the design and organization of public libraries, school buildings, work-places, and other facilities that would see a rapid acceleration into the early twenty-first century. The rise and fall of internet cafes, which thrived in the 1990s before smartphones and Wi-Fi connections became commonplace, is one example of the short life of some communications-related structures in a time of rapid technological change.

Photo Gallery

The table below lists a selection of subthemes and types of places related to theme 5 and is excerpted from "Twentieth-Century Themes, Subthemes, and the Places That Exemplify Them" (see pp. 10–15). It is followed by a gallery of photos showing a diverse range of buildings, sites, structures, and landscapes from around the world that exemplify the issues and subthemes discussed. The text accompanying each photo explains how that place represents the theme of the preceding essay. Some of these places may already be listed as heritage places (from local inventories to the World Heritage List) while others are not, though they *may* be identified as significant in the future. Some are specifically mentioned in the text; many are not. All are included here as exemplars to prompt broad exploration of potential heritage places.

Theme 5	TRANSPORTATION SYSTEMS AND MASS COMMUNICATIONS
Subthemes	**Types of Places**
• Expansion of long-distance transport of goods and people • Evolution of older modes of transportation • Introduction of trucks and buses • The introduction and growth of air travel • Expansion and contraction of earlier forms of communications • Development of mass communications • The rise of digital technology	• Railway stations, facilities, and infrastructure • Bridges • Bus stations and networks • Roads, freeways, and motorways • Passenger shipping terminals • Airports and related facilities • Postal facilities • Telecommunications networks and infrastructure • TV and radio broadcasting stations, networks, and facilities • Computer- and internet-related sites

▲ **Figure 5.1. Kuala Lumpur Rail Station, 1910, Kuala Lumpur, Malaysia.** Designed by British-born architect Arthur Benison Hubback for the Malaysian Public Works Department, this landmark building features Mughal details including chhatris (domed rooftop pavilions). The station, which housed an equally grand hotel and restaurant, connected the growing colonial metropolis to the rest of the Malay Peninsula. Though intercity train services were diverted to a new central station beginning in 2001, this station continues to serve a limited number of commuter trains today.

Photo: 2007, Gary Houston, courtesy Wikimedia Commons, CC01.0.

▶ **Figure 5.2. Hamamatsu Station, ca. 1964, Hamamatsu, Shizuoka Prefecture, Japan.** Hamamatsu Station is a stop on the Tōkaidō Shinkansen high-speed rail line, which runs between Tokyo and Shin-Ōsaka. Opened in 1964, it is the oldest such route in the world and one of the most heavily used. In subsequent years, Japan developed a network of bullet-train lines to link distant regions with its capital, Tokyo. In metropolitan regions, it also serves as a commuter rail line.

Photo: 2006, DAJF, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 5.3. Busáras central bus terminal, 1945–53, Dublin, Ireland. This central bus station, servicing intercity and regional areas, was designed by Irish architect Michael Scott in an international modern style. The undulating, cantilevered canopy provided shelter for passengers as they moved from the concourse to buses parked in the open. Incorporating public art and fine finishes, the building was awarded the Triennial Gold Medal from the Royal Institute of the Architects of Ireland in 1955. The bus station also performed public service functions and had a newsreel cinema in the basement for patrons while they waited. It has remained in continuous use, a social hub and community landmark.
Photo: 2019, ©Sheridan Burke.

Figure 5.4. Canada Place cruise terminal, 1986, Vancouver, British Columbia, Canada. With the rise of the cruise industry beginning in the 1960s, existing passenger ship terminals were renovated and new ones constructed in many ports around the world. Canada Place was built on the footings of the former Canadian Pacific Railway Pier B-C, which served the shipping and passenger trades from 1927 until the 1970s. The new structure was first used as the Canada Pavilion at Expo '86, then was adapted for permanent use as a cruise terminal and convention center with attendant facilities.
Photo: 2009, no1nose, courtesy Flickr, CC BY-NC-SA-2.0.

Figure 5.5. Washington Dulles International Airport, 1958–62, Washington, DC, USA. Located in a rural area twenty-six miles (forty-two kilometers) outside of the US capital, Dulles was the second airport to service the rapidly growing DC area. It was the first in the country designed to handle commercial jets. Finnish-born US architect Eero Saarinen designed the main terminal, a graceful, flight-like structure, so that it could be extended when the need arose. As passenger traffic increased, Dulles underwent several expansions, including one of the main terminal in 1996 in accordance with Saarinen's original vision.

Photo: Joe Ravi, 2011, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 5.6. Kandahar International Airport (renamed Ahmad Shah Baba International Airport in 2019), 1954–62, Kandahar, Afghanistan. Kandahar International Airport was designed and built by the United States Agency for International Development. Its original purpose was as a refueling stop for aircraft traveling between the Middle East and Southeast Asia. The advent of jet aircraft brought this need to an end, and the airport subsequently saw little use. During the Soviet War in Afghanistan in the 1980s, it was used by Soviet Union forces. Local warlords and the Taliban later took control of the airport and held it until the US-led invasion in late 2001. It is now operated by the Afghan Civil Aviation Authority.

Photo: 2005, Spc. Jerry T. Combes, US Department of Defense, courtesy Wikimedia Commons, public domain.

Figure 5.7. General Post Office, 1988, Doha, Qatar. Doha's General Post Office opened in 1988 to better serve the needs of a rapidly growing population, thirty-eight years after postal service began in the country. Home delivery was not a standard service offered by Qatar Post; rather, parcels and letters were received and stored in rented post office boxes on-site. Thus the building itself played a prominent central role in the daily lives of citizens. It currently houses some twenty-five thousand electronic post office boxes, a technological innovation and the first of its kind anywhere in the world.

Photo: 2012, Darwinek, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 5.8. AT&T Long Lines Building, 1974, New York, New York, USA. This windowless high-rise was conceived by the American architectural firm of John Carl Warnecke and Associates and was the world's largest long-distance phone call processing center. Made to house and protect communications equipment, not people, the controlled, bunker-like Brutalist structure of twenty-nine floors was designed during the Cold War to withstand a nuclear attack in a manner that afforded protection to machinery but not necessarily to the few people allowed to enter the building.

Photo: 2007, Marcin Wichary, courtesy Wikimedia Commons, CC BY-2.0.

Figure 5.9. Public use telephones, 1970s–1990s, São Paulo, Brazil. Once ubiquitous, public pay phones are today a rare sight in cities. At one time, ready access to these phones offered the unprecedented ability to remain in closer contact with people both near and far, even for those who could not afford a private domestic line. In Brazil, these architect-designed, fiberglass *Orelhão* ("big ear") phone shelters are an iconic, much beloved national symbol. Their distinctive ergonomic shape provides maximum sound isolation and user protection without being obtrusive.

Photo: 2006, Morio, courtesy Wikimedia Commons, CC BY-SA 3.0.

Figure 5.10. Sentech Tower, 1961–62, Brixton, Johannesburg, South Africa. Television steadily replaced radio and newspapers as a major source of information and entertainment during the second half of the twentieth century. Originally called the Albert Hertzog Tower and commonly known as the Brixton Tower, the Sentech was designed by London-based Ove Arup and Partners. Initially used only for FM radio transmitters, it was adapted as Johannesburg's main television broadcasting tower in the mid-1970s.

Photo: 2008, NJR ZA, courtesy Wikimedia Commons, CC BY-SA-4.0.

▲

Figure 5.11. Yamanashi Press and Broadcasting Center, 1961–66, Kōfu, Yamanashi Prefecture, Japan. Designed by Japanese Metabolist architect Kenzo Tange, this cast-in-place concrete building was planned to accommodate three major communication functions: a newspaper printing plant, a radio station, and a TV broadcasting station. These functions were legible in the design of the facade, with printing equipment located on the ground floor, sealed studios on upper floors, glass-walled offices with balconies, and cylindrical service shafts for stairwells, elevators, and HVAC. In addition, free open-plan spaces and fluid transitions to the urban space outside were incorporated.

Photo: 2016, さかおり (Sakaori), courtesy Wikimedia Commons, CC BY-SA-4.0.

NOTES

1. Christian Wolmar, *Blood, Iron, and Gold: How the Railroads Transformed the World* (New York: Public Affairs, 2010), 306–17.
2. "Rail Lines (Total Route-Km)," World Bank Open Data, accessed January 2019, https://data.worldbank.org/indicator/IS.RRS.TOTL.KM?view=chart.
3. Philip Brasor and Masako Tsubuku, "How the Shinkansen Bullet Train Made Tokyo into the Monster It Is Today," *The Guardian*, September 30, 2014, https://www.theguardian.com/cities/2014/sep/30/-sp-shinkansen-bullet-train-tokyo-rail-japan-50-years.
4. Wolmar, *Blood, Iron, and Gold*, 319–25.
5. *Encyclopedia Britannica*, s.v. "Truck," by Archie H. Easton and George C. Cromer, last modified March 19, 2019, https://www.britannica.com/technology/truck-vehicle.
6. *Encyclopedia Britannica*, s.v. "Bus," by Archie H. Easton and George C. Cromer, last modified May 14, 2019, https://www.britannica.com/technology/bus-vehicle.
7. Sidney Pollard, "British and World Shipbuilding, 1890–1914: A Study in Comparative Costs," *Journal of Economic History* 17, no. 3 (September 1957): 426–28.
8. US Department of Transportation, Bureau of Transportation Statistics, Maritime Administration, and US Coast Guard, *Maritime Trade and Transportation '02* (Washington, DC: US Department of Transportation, 2002), 32, table 2.1.
9. David Mc.A Baker, "The Cruise Industry: Past, Present and Future," *Journal of Tourism Research* 14 (October 2016): 142.
10. See Alastair Gordon, *Naked Airport: A Cultural History of the World's Most Revolutionary Structure* (Chicago: University of Chicago Press, 2008); and Bob Hawkins, Gabriele Lechner, and Paul Smith, eds., *Historic Airports: Proceedings of the International l'Europe de l'Air Conferences on Aviation Architecture: Liverpool (1999), Berlin (2000), Paris (2001)* (London: English Heritage, 2005).
11. Patricia Koza, "O'Hare Still the World's Busiest Airport," *UPI*, April 24, 1981, https://upi.com/6014294. This article cites statistics from Airport Operators Council International, "Worldwide Airport Traffic Report."
12. "Passenger Traffic 2000 FINAL," Airports Council International, last modified November 1, 2001, https://aci.aero/data-centre/annual-traffic-data/passengers/2000-final-summary/.
13. For an overview of airports in the twentieth century, see *Encyclopedia Britannica*, s.v. "Airport," by Norman J. Ashford, last modified July 18, 2019, https://www.britannica.com/technology/airport.
14. Ayesha Abid, "Sears Is Fading, but Memories of Its Mail-Order Homes Endure," National Public Radio, October 20, 2018, https://www.npr.org/2018/10/20/657770791/sears-is-fading-but-memories-of-its-mail-order-homes-endure.
15. Tom Rowley, "Telegram System Ends. Stop. Replaced by Text Messages. Stop.," *The Telegraph*, June 14, 2013, https://www.telegraph.co.uk/technology/internet/10120701/Telegram-system-ends.-Stop.-Replaced-by-text-messages.-Stop.html.
16. Wikipedia, s.v. "History of Radio," last modified January 7, 2020, https://en.wikipedia.org/wiki/History_of_radio; and *Encyclopedia Britannica*, s.v. "Radio," by Christopher H. Sterling and Randy Skretvedt, last modified November 15, 2018, https://www.britannica.com/topic/radio.
17. Richard Landesberg and Mark J. Pescatore, "Television Broadcasting, History of," in *Encyclopedia of Communication and Information*, ed. Jorge Reina Schement, vol. 3 (New York: Macmillan Reference, 2002), 1024. Accessible on Encyclopedia.com, last modified November 26, 2019, https://www.encyclopedia.com/media/encyclopedias-almanacs-transcripts-and-maps/television-broadcasting-history; and Wikipedia, s.v. "History of Television," last modified December 21, 2019, https://en.wikipedia.org/wiki/History_of_television.
18. Jérôme Bourdon, "Is Television a Global Medium? A Historical View," in *Global Currents: Media and Technology Now*, ed. Tasha G. Oren and Patrice Petro (New Brunswick, NJ: Rutgers University Press, 2004), 100, www.jstor.org/stable/j.ctt5hj9k6.9; and Mitchell Stephens, "History of Television," NYU Classes, accessed December 17, 2019, https://www.nyu.edu/classes/stephens/History%20of%20Television%20page.htm (originally published in *Grolier Encyclopedia 2000* [Danbury, CT: Grolier Interactive, 1999]).
19. UNESCO Statistical Division, *Statistics on Radio and Television, 1950–1960*, Statistical Reports and Studies ST/S/8 (Paris: UNESCO, 1963), 23, https://unesdoc.unesco.org/ark:/48223/pf0000033739; and UNESCO International Program for the Development of Communication, *World Communication Report* (Paris: UNESCO, 1989), 149, table 5.7, https://unesdoc.unesco.org/ark:/48223/pf0000188715.
20. James Pelkey, "Three Revolutions in Computer Technologies and Corporate Usage 1968–1988," chap. 0.4 in *Entrepreneurial Capitalism and Innovation: A History of Computer Communications, 1968–1988* (2007), accessed August 5, 2020, http://www.historyofcomputercommunications.info/Book/Introduction/0.4-ThreeRevolutionsComputerTechnologiesCorporateUsage68-88.html.

Theme 6

Internationalization, New Nation-States, and Human Rights

The twentieth century was an era of political, social, and economic revolution—through conflict and by peaceful means—when change was swift and impacted much of the world. Governments were formed based on emerging and evolving ideologies that reshaped the world order. Empires declined and decolonized, giving rise to newly independent states that set about the process of nation building.

A great ideological divide between the communist and capitalist worlds dominated much of the second half of the century. Almost all regions of the world were experiencing the effects of two world wars. In response, governments banded together to form international institutions, including the League of Nations and, later, the United Nations, to establish international law and address global issues as diverse as disarmament, the protection of culture, the elimination of hunger, and human rights. By interacting across borders, nations found ways to achieve many mutual outcomes. NGOs (nongovernmental organizations) played increasingly important roles in sustaining and improving quality of life in many nations. As people in places around the world organized to demand individual and human rights, governments and the community of nations answered the call by pursuing an ever-broadening understanding of what those rights were and to whom they applied.

Evolving Political Ideologies

The complicated evolution of political ideologies and systems can only be touched upon here. This essay focuses on three main political trends that defined the course of twentieth-century history—democracy, communism, and totalitarianism, or fascism—and the built and natural environments that they created. In the early 1900s, the "political map of the world was overwhelmingly imperial,"[1] but the old monarchical order was beginning to crumble in the face of such changes as industrialization and the rise of mass politics. As the next decades unfolded, popular elections were held in many places in one form or another, particularly in Europe after World War I (WWI), but democracy—defined as a political system that allows participation from all adult citizens, places constraints on government power, and guarantees civil liberties[2]—was slow to take hold. Despite the language of self-determination

that infused the founding documents of the League of Nations (discussed further below), this flirtation with popular participation was short lived, and many of these young democratic regimes soon yielded to dictatorships.[3]

Political movements based on Marxism and Leninism led to the founding of new communist nations during the twentieth century. The first of these, following the 1917 Russian Revolution, was Soviet Russia; the creation of the Union of Soviet Socialist Republics (USSR) was proclaimed in 1922.[4] After the end of World War II (WWII), Marxism played an active role in the revolutions of China (1949), Cuba (1959), Guinea-Bissau (West Africa, 1974), Benin (1975), Laos (1975), and Vietnam (1976). In 1945 and 1950, respectively, both Germany and Korea were divided into capitalist and socialist states.

Architecture and cultural landscapes were fundamentally altered under Joseph Stalin's rule (1929–53) in the USSR, when the country and its satellites were compulsorily industrialized. Stalin himself repudiated Constructivism and other manifestations of modern art and architecture and instead favored a Beaux-Arts influence merged with Russian vernacular and imperial designs.[5] Across the Soviet Empire (encompassing nations within and to the south and west of the USSR), major public buildings and civic spaces, as well as thoroughfares and housing complexes, were rebuilt in the "Stalin Empire style" (also known as socialist classicism).[6]

The rise of communism in Russia was one of the factors that gave birth to a new right-wing, anti-Marxist political movement. Fascism emerged first in Italy, when Mussolini came to power in 1922, followed by Germany with Hitler's rise in 1933. Right-wing elements grew in strength in Japan in the 1930s, and fascist parties and governments emerged in other countries during the interwar period, including Spain, which was wracked by a violent civil war between 1936 and 1939. These movements differed significantly from one another but shared common traits: autocratic governments headed by a dictatorial leader; extreme militaristic nationalism; elevation of interests of the state over those of the individual; suppression of political opponents, often through violence; and opposition to political liberalism.

Fascist leaders such as Mussolini and Hitler used architecture as a means of expressing the new nationalist culture and building national pride by projecting a strong, stable, prosperous, and unified country. Drawing on modernism, Fascist architecture tended toward rationalist and stripped-down classicist styles. These sites were often large in scale, built to impress and to provide a sumptuous backdrop for mass gatherings, for example at the Nazi Party rally grounds at Nuremberg in Germany.

These new authoritarian regimes posed a challenge to democratic powers as they sought to reshape the world order that had emerged after WWI. Sharp divisions between liberal democracy, communism, and fascism grew to crisis levels during the 1930s, eventually leading to the eruption of a second world war (for more on the two world wars, see theme 10). The end of WWII brought an end to fascism in Japan, Germany, and Italy but left much of Europe, the UK, and parts of Asia in tatters.

From the mid-1940s until the late 1980s, old imperial age tensions and conflicts between the great powers of Europe were replaced by a new, ideological conflict between the capitalist Western bloc (the US, NATO countries, and their allies) and the communist Eastern bloc (the USSR and its satellite states). The Cold War effectively divided much of the globe into two spheres of influence led by the two superpowers: the US and the USSR (for more on the Cold War, see theme 10). Between 1953 and 1956, to forge a path affiliated with neither ideological bloc, the Non-Aligned Movement was initiated

by an international group of leaders: Josip Broz Tito of Yugoslavia, Jawaharlal Nehru of India, Kwame Nkrumah of Ghana, Sukarno of Indonesia, and Gamal Abdel Nasser of Egypt.[7]

Although the rise of democratic governments was sometimes hindered by colonial administrations and authoritarian regimes, democracy became the most widely adopted political system over the course of the twentieth century. Democratic nations gradually increased in number from about ten in 1900 to nearly one hundred by 2000.[8] A number of new democratic states were born in the wake of each of the world wars, as well as at the end of the Cold War.

Imperialism, Colonialism, and Decolonization

For the first half of the twentieth century, many European colonial powers—Belgium, Great Britain, France, Germany, the Netherlands, and Portugal—continued to hold territories in Africa, the Middle East, Asia, and the South Pacific. The US victory in the Spanish-American War of 1898 greatly reduced Spain's colonial holdings while launching the US on its imperialist expansion. In 1900, European nations and capitalist companies controlled the entire continent of Africa except for Liberia and Ethiopia, which remained independent.[9] Some colonial powers, including the Ottoman, Austro-Hungarian, and German Empires, even ruled areas of Europe. In Africa and Asia, many historic, imposing civic spaces and administrative structures of the early twentieth century, now frequently identified as significant "heritage" places, were constructed and used originally by colonial regimes. Some of these sites, such as the Secretariat Building in Yangon, Myanmar (1905), played central political roles in colonial, postcolonial, and postindependence life.

The Middle East was also part of the Ottoman Empire, and no independent nation existed in that region until the 1920s (early in the century, "Middle East" replaced "Near East" to denote a transcontinental region between India and Arabia; note that both terms are Eurocentric).[10] The fall of the Ottoman Empire at the end of WWI left the Middle East divided into spheres of colonial influence, mainly British and French, despite the emergence of movements for an independent Arab world and the Arab revolt of 1916–18.

After WWI, the signing of the Treaty of Versailles resulted in boundary decisions on several continents and across the Pacific, changing and creating mandates with enduring political and cultural consequences.[11] Further adjustments to national boundaries and the loss of overseas colonies belonging to former Axis countries occurred following WWII. New nation-states emerged in the aftermath of both wars.

Decolonization was typically a long, drawn-out process hastened after World War II by three main factors: the growing demand for independence by colonized and other subjugated peoples; the diminishing strength of imperial powers and territories, as made evident by WWII; and the rise of international support for self-determination, most notably from the United Nations after 1945.[12] Between 1945 and 1960, three dozen new nation-states in Africa and Asia achieved either autonomy or complete independence from European colonial powers.[13] In 1960 alone, for example, seventeen sub-Saharan African nations were created when France, Belgium, and Great Britain relinquished sovereignty over these formerly colonized territories.[14] Throughout the 1960s and 1970s, other territories gained independence from France, Spain, Portugal, the Netherlands, or Britain. However, despite the United Nation's dedication to the issue of self-determination, at the turn of the twenty-first century there were still a number of "non-self-governing" territories, most of which were islands in the Caribbean or Pacific.[15]

Postcolonialism, Independence, and Emerging Nation-States

The rise of the nation-state predated the twentieth century, but in many parts of the world the emergence of new nation-states was one of the era's defining experiences, variously marked by conflict, peaceful negotiation, or stasis. Three phases in particular saw a profusion of these entities that were either newly established or reestablished as sovereign nations after occupation: (1) the interwar years (1918–39), as a result of the demise of the Austro-Hungarian, German, Ottoman, and Russian Empires, when countries including Turkey, Poland, Estonia, Hungary, and Czechoslovakia emerged; (2) the early post-WWII period (1945 to the 1960s), when there was an explosion in the formation of new nation-states, in part due to the end of European colonial rule in Africa and Asia; and (3) the 1980s and 1990s, when independent nations such as Armenia, Lithuania, Kazakhstan, and Slovenia emerged or were reestablished in Eastern and Central Europe, the Baltics, and the Caucasus region as the former republics of the USSR and Yugoslavia disintegrated.

Full autonomy was rarely immediate, however, and contested all too frequently through civil war. Many sites are associated with such events but have not been designated as heritage or otherwise protected. The redrawing of national boundaries sometimes left groups of people without political rights. Stateless minorities such as the Kurds and the Palestinians struggled continuously for the establishment of an autonomous state.

Other transitions to independence were also drawn out. Though the British Parliament passed three acts unifying colonies to form dominions in Canada (enacted 1867), Australia (1900), and South Africa (1909), full autonomy would not come until a further act in 1931, and the Indigenous peoples of these dominions would not gain equal citizenship until 1985, 1967, and 1994, respectively. Decades of public protest and political action, massive violence attending Partition in 1947, and civil war brought about the creation of the nations of India and Pakistan and later Bangladesh in the former British Raj on the Indian subcontinent. Religion played a large part in the geographic definition of their new national boundaries. Great Britain's influence on the language, law, institutions, and cultures of these and other once-colonial territories persisted long after independence, including in numerous structures and sites.

Revolt against Soviet domination was mounted in a number of ways, for example in East Berlin in 1953, Hungary in 1956, Prague in 1968, and Poland in 1980, when the independent trade union Solidarity (Solidarność) mounted strikes at the Gdansk shipyard. The fall of the Berlin Wall in 1989 heralded the end of communist domination of Eastern Europe and the demise of the Soviet bloc, and signaled the end of the Cold War. The disintegration of socialist rule also reignited nationalism in former satellite states in Eastern Europe and triggered civil wars and ethnic cleansing in the former Yugoslavia.

As new nations formed, parliaments were elected (or appointed) and governments established at national and local levels and in regions often named "states" in federal systems. In multiparty systems, political parties reflected economic divisions, such as labor and management, or ideological divisions between, for instance, conservatives and liberals. In a one-party system, a single political party has the right to form a government.

In 1949, the Communist Party of China (a one-party state) became the world's largest ruling party, with millions of members; around two hundred seniormost leaders made up its Central Committee. Over the ensuing decade, China established a national system of design institutes that propagated an approach known as "socialist realism" (socialist in content, national in form), derived from Soviet precedents that the Chinese adapted to their own contexts. Subsequently, the Great Proletarian Cultural Revolution (1966–76) led to the widespread destruction of historic structures in an effort by revolutionaries to purge the country of its pre-socialist cultural heritage. However, after new national conservation legislation in 1982, Chinese authorities began reassessing and protecting historic places, a challenge made even more formidable due to intensifying urbanization policies that began in the 1990s.

With the growth in the number of independent nations, an unprecedented number of new capital cities were established in the twentieth century. In 1900, there were approximately forty nation-states with capital cities; by the year 2000, there were more than two hundred.[16] Many of these new capitals were established in existing cities; some, such as Beijing and Moscow, were historic capitals restored to their earlier status. Other capital cities were newly planned and built, including Canberra, Australia (1913), and Brasília, Brazil (1960), as well as Chandigarh, India (1947), the capital of the state of Punjab (and also of Haryana after 1966). Eritrea's capital, Asmara, was originally developed as a colonial outpost.

Around the world, nationhood was represented in many tangible forms, including city planning and in the buildings designed to serve both administrative and ceremonial purposes. In many cases, these revealed the aspirations of the new state. Prominent independence monuments also marked the transition to nationhood, and many became both icons of national identity and rallying points for public celebrations or protests.

Other physical manifestations of the growth of nation-states were visible in the embassies and national parliament buildings that sprang up in capital cities around the world. Such buildings were frequently designed to express national identity and architectural expertise.[17] Local architects often embraced a "modern" nationalist architectural stance, influenced by the modernist design introduced by colonial administrations and international architects. Sometimes local architects learned this approach in Western schools such as the Department of Tropical Architecture at the Architectural Association in London.[18] Tropical Modernism had a major impact on the new architecture of Africa, South America, and Asia. Around the world, international trends found fresh expression when adapted to regional contexts.[19] In Africa and Asia, the US and USSR funded the construction of libraries, stadiums, and other cultural and public buildings as part of their Cold War strategy to exert favorable influence on newly independent countries.

National governments took on responsibility for the infrastructure needed to provide defense, immigration, and policing and public order, and for the use of taxes to pay for these services in addition to education and public health. Catastrophic events sometimes spurred these responses. The devastating global influenza pandemic of 1918–19, which led to the deaths of an estimated 50 million people or more,[20] forced the adoption of national health policies and the acknowledgment that control of international travel was necessary.

Advances in technology (often state controlled) and the development of new infrastructure played a major role in nation building, particularly in large countries such as China, Brazil, and Australia. The new People's Republic of China embarked on large-scale reconstruction and extension of its railway network in 1949, constructing 15,000 kilometers of new track by 1964 and adding another 40,000 kilometers in the 1970s, 1980s, and 1990s.[21] In Australia, also beginning in 1949, the Commonwealth Government's Snowy Mountains Scheme for hydroelectricity and inland irrigation brought in thousands of European migrant workers to construct the country's greatest engineering works while promoting national industrialization and urban development.[22] The Shannon Hydroelectric Scheme (1922–29) demonstrated the ability of the newly independent Irish Free State (a Dominion of the British Commonwealth of Nations from December 1922 to December 1937) to initiate a massive nation-building project that created a power grid for the entire country.

More new nations were formed than ever before during the twentieth century, yet not all were stable. Ethnic populations shifted (sometimes as a result of civil war), national boundaries were altered, nations were renamed, and some nations disappeared altogether when realigned or absorbed by another. The disappeared nations (as well as former empires) left traces in the century's built heritage. In the present Federal Republic of Germany, for example, the twentieth-century heritage includes sites related to the reunification of Germany in 1990, those dating from the period of the division into East Germany and West Germany, and the heritage of prior regimes: the totalitarian Nazi regime, the Weimar Republic, and the prerevolutionary German Empire.

Internationalization, NGOs, and International Law

The proliferation of international organizations and international law led to global action in addressing world problems. In 1913, establishment of an international law administrative building, the Peace Palace at The Hague in the Netherlands, was an early, enduring symbol of these ideals and of international collaboration.[23] While international humanitarian work dated from the formation of the Red Cross in the nineteenth century, humanitarian action by civil and governmental organizations on a global scale was fundamental to the extension of human rights in the twentieth century. These actions, especially after WWII—often in conjunction with organizations such as the United Nations (UN)—included efforts to feed, house, educate, and provide health services to poor and marginalized peoples, especially women and children, and refugees whose numbers reflected national, ethnic, and religious conflicts as well as famine and poverty.

International communities were first assembled as the League of Nations following the end of WWI. Founded in 1919 during the Paris Peace Conference, the league was officially inaugurated in January of 1920. Swiss-born French architect Le Corbusier entered the competition set by the league in 1927 for the design of its new headquarters in Geneva, Switzerland. His functionalist plan, though not accepted, became the prototype for future UN buildings.[24] The League of Nations was succeeded by the United Nations (founded 1945) and its specialized agencies. These included UNESCO (the United Nations Educational, Scientific and Cultural Organization) and the Food and Agriculture Organization of the United Nations, both also created in 1945.

A number of renowned architects serving on international committees oversaw the design and construction of both the UN headquarters in New York, New York (completed 1952) and UNESCO's headquarters in Paris, France (1958).[25] International action on behalf of human rights demanded the recognition of a high standard of health as a fundamental right, and the World Health Organization (WHO) was established in 1948 as another specialized agency of the UN. The WHO's Geneva headquarters building, designed by Swiss architect Jean Tschumi following an international competition, was inaugurated in 1966.

The UN's growth was matched by that of international NGOs active in both advocacy and operations. Some NGOs and humanitarian projects were supported by wealthy philanthropists and corporations, as well as by grassroots membership. The earliest international humanitarian organization was the International Committee for Relief to the Wounded, founded in Geneva in 1863. It was a forerunner to the organization now known as the International Federation of Red Cross and Red Crescent Societies, which was established in Paris in 1919 in the aftermath of WWI.[26] The International Committee of the Blue Shield, the cultural equivalent of the Red Cross, was set up in 1996 to protect the world's cultural heritage threatened by conflict or disaster (for more on international heritage organizations, see theme 7).[27] Other multinational humanitarian organizations included associations of professionals, such as the doctors and journalists who founded Doctors Without Borders (Médecins Sans Frontières, or MSF) in France in 1971 to offer medical aid in areas of war and natural disaster.[28] MSF contributed a built heritage of hospitals, clinics, and field offices in places around the world.

International and regional intergovernmental organizations and groupings continued to grow in number and reach during the century. Among them were the International Court of Justice in The Hague (established 1945), the Organization of American States (1948), the North Atlantic Treaty Organization (NATO, 1949), the European Economic Community/European Union (1957/1993), the Organization of African Unity (1963), and the Association of Southeast Asian Nations (1967). Associations of Arab countries also began to emerge; the first summit meeting of the Arab League was held in 1964 in Cairo, in newly independent Egypt. Many of these organizations built impressive new headquarters buildings.

The Nuremberg war crimes trials of 1945–46, held in Germany, were a pivotal event in the internationalization of human rights and the codification of international law. An international military tribunal that tried former Nazi leaders, the Nuremberg proceedings affirmed universal values and focused global attention on the need for a worldwide human rights regimen based on an international rule of law. Although the codification of these rights moved slowly following adoption of the Rome Statute of 1998 (which took effect in 2002), the intergovernmental International Criminal Court was successfully established, and human rights were formally recognized under international law.[29]

Human Rights, Civil Rights, and Individual Rights

The drive toward nationhood frequently involved conflict, protest, and suppression, and reflected the impact of earlier movements on behalf of collective human and individual rights. Many twentieth-century independence movements drew on the language of natural rights expressed in the eighteenth-century American and French Revolutions. On September 2, 1945, for example, in Hanoi's

Ba Dinh Square, Ho Chi Minh declared Vietnam's independence from France in a proclamation that referenced both the US Declaration of Independence and the French Declaration of the Rights of Man and the Citizen.[30]

Recognition of human rights and the rights of the individual applied to ever-widening social groups both within nations and across the world. Although slavery had been abolished by many nations before or during the nineteenth century, an increasingly international antislavery movement rose up in the twentieth century. Going forward, the definition of *slavery* was expanded to encompass a wider array of forms of exploitation, including forced labor, prostitution, and marriage, and the exploitation of child, migrant, and contract labor.[31]

Organized labor unions formed in many countries in the latter decades of the nineteenth century, seeking to improve working conditions through collective action. They frequently met with violent resistance on the part of employers. As the twentieth century progressed, workers' rights gradually came to be recognized as human rights.[32] Yet, despite this evolving international framework, the experiences of laborers varied wildly across the century depending on factors related to where and how they lived and worked. The largest organizations, including the Trades Union Congress in the UK, the AFL-CIO in the US, the Congress of South African Trade Unions, and the All-China Federation of Trade Unions, were powerful political forces. Union halls and their equivalents served as important meeting places for planning industrial action, and some have been afforded heritage protections. A number of labor unions erected memorials to both bitter disputes and proud victories. In some places, especially socialist and communist administrations, the state erected memorials to workers and their struggles.

Throughout the century, racial, ethnic, and religious minorities in many parts of the world struggled to attain equal human and civil rights. The 1960s and 1970s in particular were decades of great unrest and social change across the globe, marked by burgeoning popular support for social justice and the rights of minority groups. Unlike the prominent edifices of twentieth-century nationhood, many of the sites associated with human rights movements and achievements—Robben Island in South Africa and a number of monuments and destinations significant to the civil rights movement in the US, to name a few—are modest or architecturally undistinguished places yet are of great social significance and redolent with meaning (for more on the recognition of these types of places, see theme 7).

Feminism, the movement for equal rights for women, dates from the second half of the nineteenth century in North America, Australia, New Zealand, and some European countries, and spread to other parts of the world through the twentieth century. Initially, its focus was on political rights, especially the vote, and other legal inequalities. Women's suffrage—the right of women to vote in national elections—was enacted at different times throughout the twentieth century. At the dawn of the century, women had been granted this right only in a handful of British colonies or dependencies, including New Zealand (1893) and Australia (1902). By century's end, women had won the right to vote in the vast majority of countries.[33]

Beginning in the 1960s, a resurgence of feminist activism more broadly addressed cultural and legal gender inequalities. Efforts to redress such matters extended to many regions of the world, though these varied in the issues that were taken up and the outcomes gained. For example, in the 1980s,

while activists in the US fought (unsuccessfully) to secure ratification of the Equal Rights Amendment to the US Constitution, large protests were mounted against the dowry system and dowry deaths in Delhi, India. Despite amendments to the Indian Dowry Prohibition Act and penal code intended to protect women from violence, the problem persisted throughout the years.[34] In addition to campaigns against violence, women in many places around the world worked vigorously to change laws relating to, among other issues, pay inequalities, girls' education, and reproductive rights. The places associated with women's rights vary widely. They include sites of protest and change but also the redesign and interior reorganization of many types of public buildings and workplaces to accommodate women, as well as such places as women's clubhouses, schools and colleges for girls and women, and childcare centers and women's shelters. The movements for women's and minority rights that exploded in the 1960s and 1970s inspired other persecuted groups, including homosexual, bisexual, and transgender people, to organize and fight for equal rights and social equality, even though homosexuality remained illegal in many countries by the end of the century.

Around the world, Indigenous peoples—known by a multitude of names—struggled against the systematized legal and social discrimination that was the legacy of conquest and colonialism. Although their customs and cultures varied from place to place, Indigenous groups shared similar experiences, including loss of ancestral lands, treatment as second-class citizens, denial of the rights of citizenship, denial of the right to practice their native language, religion, and culture, and forced assimilation.

These struggles initially played out at both local and national levels. Efforts to secure Indigenous rights before an international body began in the 1920s, when representatives of groups from Canada and New Zealand filed complaints with the League of Nations in 1923 and 1925, respectively, about the failure of their governments to uphold treaties.[35] In subsequent decades, the league (now the United Nations), the International Labour Organization, and other international bodies began paying more attention to Indigenous rights. The UN Working Group on Indigenous Populations, founded in 1982, drafted an overarching document that would help protect the rights and privileges of this group throughout the world; the Declaration on the Rights of Indigenous Peoples was adopted by the UN General Assembly in 2007.[36]

Indigenous peoples in many countries drew on their wartime service, as well as the approaches used by civil rights movements elsewhere in the world, to gain equal rights, though full citizenship and voting rights proved to be a slow gain in some places. They also sought freedom from authoritarian control, such as the apartheid system in South Africa and Zimbabwe (formerly Rhodesia) and restriction of movement from designated Aboriginal reserves in Australia. In the early 1970s and into the 1980s, groups of Australian Aboriginal peoples began moving from towns, stations, and government reserves to live on their traditional lands—including at Kintore and Utopia, in the Northern Territory—in what came to be known as the outstation, or homelands, movement. Struggles for self-determination and land rights continued in many places through the remainder of the century.

Freedom of expression and the right to live outside of social norms manifested in utopian and "alternative" living arrangements and settlements, especially in western countries, as illustrated by many countercultural settlements or communes. Well-known examples are Findhorn, in Scotland (established 1972), and Freetown Christiania, in Copenhagen, Denmark (1971).

Civil society organizations—groups representing the "third sector" outside of government and business—became a significant force in building support for human and individual rights at the local, national, or global scale. In the last decade of the twentieth century, advances in information technology magnified the reach and power of individual leaders and groups. The internet enabled organizations to give instantaneous notice of events and allowed thousands, even millions, of individual efforts to be swiftly combined into a powerful collective force. While this method could, and soon did, support positive action on regional and international problems, the internet also became a tool used for nefarious reasons by extremist groups.

Photo Gallery

The table below lists a selection of subthemes and types of places related to theme 6 and is excerpted from "Twentieth-Century Themes, Subthemes, and the Places That Exemplify Them" (see pp. 10–15). It is followed by a gallery of photos showing a diverse range of buildings, sites, structures, and landscapes from around the world that exemplify the issues and subthemes discussed. The text accompanying each photo explains how that place represents the theme of the preceding essay. Some of these places may already be listed as heritage places (from local inventories to the World Heritage List) while others are not, though they *may* be identified as significant in the future. Some are specifically mentioned in the text; many are not. All are included here as exemplars to prompt broad exploration of potential heritage places.

Theme 6	INTERNATIONALIZATION, NEW NATION-STATES, AND HUMAN RIGHTS
Subthemes	**Types of Places**
• Evolution of totalitarianism, communism, and democracy • Evolution of imperialism and colonialism • Decolonization • Postcolonialism, independence movements, and emerging nation-states • Establishment of international NGOs • Global response to disasters • Development of international law • Struggle for and recognition of human rights • Social movements and the recognition of individual rights	• Public spaces and monuments that celebrate new nation-states • Public spaces and monuments that express political ideology or national identity • Purpose-built capital cities and administrative centers • Independence monuments and memorials • Sites related to national reunification • Infrastructure developed by new nation-states • Places related to international organizations and groupings • Sites related to natural or human-made disaster • Sites related to human rights abuses • Sites related to social movements • Countercultural sites and settlements

▲ **Figure 6.1. Independence Square (also known as Black Star Square), 1961, Accra, Ghana.** One of many large twentieth-century monuments to independence and new nationhood around the world, this vast public space in Ghana's capital city features three monuments to liberation and independence: the Independence Arch (visible at center in photo), the Liberation Day Monument, and Black Star Gate (both not shown). The square was completed four years after Ghana gained its independence from Great Britain and was inaugurated on the occasion of a state visit by Queen Elizabeth II. Since then, the area has been the site of annual independence celebrations and other national, civic, and military events. Grandstands ringing the square (visible on either side of the arch) provide seating for spectators.

Photo: 2010, Rjruiziii, courtesy Wikimedia Commons, CC BY-SA-3.0.

▶ **Figure 6.2. Reunification monument, 1974, Yaoundé, Cameroon.** This spiraling concrete structure commemorates the reunification in 1961 of French-speaking and English-speaking Cameroon in the wake of independence from France in 1960 and Great Britain the following year. These two territories were divided after 1918, when Germany (which originally had colonized Cameroon) was defeated in WWI. The two-toned concrete monument represents two uncoiling serpents—metaphors for the two Cameroons—whose heads merge at the top in the form of a slender cone that functions as a lantern symbolizing liberty.

Photo: 2013, Steve Mvondo, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 6.3. Plaza de la Revolución, 1959, Havana, Cuba. After the Cuban Revolution ended in 1959, this vast space in central Havana became the setting for massive political rallies. Framed by several administrative buildings, the plaza is flanked by two towering concrete masses that feature sculptural steel portraits of revolutionary heroes Che Guevara (shown at left in photo) and Camilo Cienfuegos (right). Conceived in the early twentieth century by French urbanist Jean-Claude Forestier, the square was known as Plaza Cívica until Prime Minister Fidel Castro's ascension to power in 1959. Since then, it has been an iconic space in the country's struggle for a communist-inspired nation-state.

Photo: 2013, Guillaume Bavière, courtesy Flickr, CC BY-2.0.

Figure 6.4. Palace of Parliament, 1984–89, Bucharest, Romania. Originally called the "People's Palace" by Romania's communist ruler Nicolae Ceauşescu, this enormous structure contains more than a thousand rooms in nine stories aboveground and nine stories below. It was erected by the hands of thousands of workers and soldiers on land previously occupied by several historic neighborhoods that were razed for the construction. More than seven hundred architects labored over its bilateral, symmetrical design in a socialist classicist mode reminiscent of Joseph Stalin's preferred style in the USSR. Still incomplete at Ceauşescu's death in 1989, the building remains a legacy of Romania's period of communist rule.

Photo: 2018, hpgruesen, courtesy Wikimedia Commons, CC0 1.0.

Figure 6.5. Memorial House of the Bulgarian Communist Party, 1974–81, Buzludzha Peak, Bulgaria. This dramatic monument to Bulgarian socialism is located in a mountainous region where several historic battles took place in the nineteenth and mid-twentieth centuries. Inside the saucer-shaped structure, designed by Bulgarian architect Georgi Stoilov and built between 1974 and 1981, are mosaics depicting socialist events. The adjacent concrete tower is surmounted by a glass star commemorating Bulgaria's socialist ideology. In 1989, when the country rejected that ideology, Memorial House was vandalized and eventually abandoned. Currently, conservation efforts are underway to restore the monument.

Photo: 2014, Mark Ahsmann, courtesy Wikimedia Commons, CC BY-SA 4.0.

Figure 6.6. Palazzo della Civiltà Italiana, 1938–43, Rome, Italy. One of the most fully realized expressions of fascist modernism was the Esposizione Universale Roma (EUR) district southwest of Rome. It was established in 1935 by Mussolini for the planned 1942 world's fair and as a symbol of fascism. Though the fair did not take place, construction continued after the war, and EUR was converted to a business and museum district. The palazzo, designed by Italian architects Giovanni Guerrini, Ernesto Bruno La Padula, and Mario Romano, is the centerpiece. Equestrian sculptural groups representing the mythical sons of Zeus and Leda are located at the four corners of the building's podium.

Photo: 2019, ©Sara Lardinois.

Figure 6.7. Monument to the Fallen Shipyard Workers of 1970, 1980, Gdansk, Poland. Erected near the entrance of the Lenin (now Gdansk) Shipyard, where in 1970 at least forty-five people were killed during protests against government oppression, this was the first monument to victims of communism erected in a communist country. When shipyard workers went on strike in August 1980 (an action that led to the birth of the Solidarity labor union), its construction was one of their demands. Designed by four Polish architects, the monument depicts three 40-meter- (131-foot-) high steel crosses rising from a base of broken concrete, symbolizing resurrection and victory in the fight to defeat communism.

Photo: 2013, Avi1111 Dr. Avishai Teicher, courtesy Wikimedia Commons, CC BY-SA-3.0.

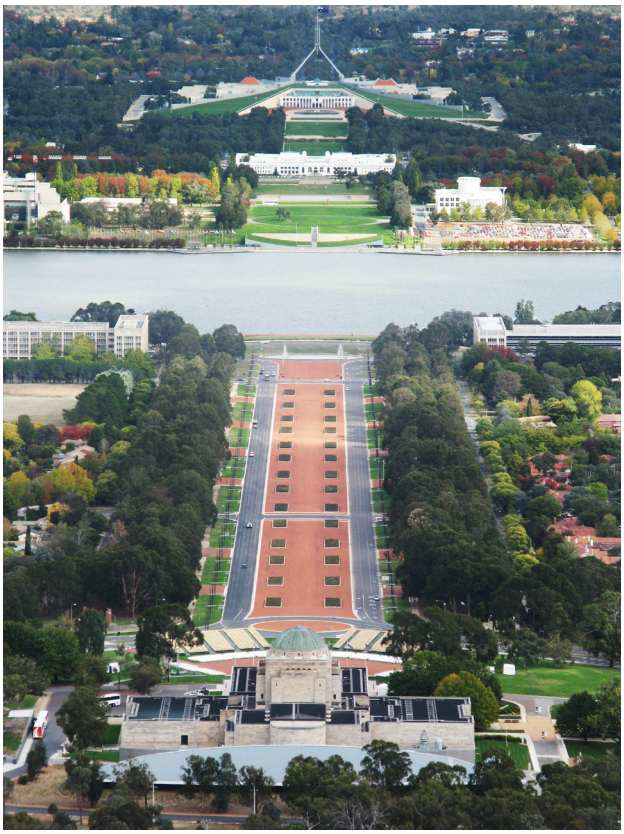


Figure 6.8. View of the city of Canberra, Federal Capital of the Commonwealth of Australia, designed 1911. The federation of Australia in 1901 and the adoption of a national constitution prompted development of a new capital city. In an international town planning competition held in 1911, the proposal of US landscape architect Walter Burley Griffin and his wife, architect Marion Mahony Griffin, was selected. Their geometric design created grand boulevards leading to national monuments, with axial land vistas to nearby hills and a water vista along a future lake. Although their visionary plan was later altered, the Griffins' idea of putting people above parliament has been retained, and the Parliamentary Triangle remains the national ceremonial precinct. The view shown here looks south from Mount Ainslie over the Australian War Memorial in the foreground, down Anzac Parade and across Lake Burley Griffin toward the Old and New Parliament Houses in the distance, bisecting the Parliamentary Triangle.

Image: 2009, ©Sheridan Burke.

Figure 6.9. National Parliament House (Jatiya Sangsad Bhaban), 1962–82, Dhaka, Bangladesh. This iconic complex is a monument to the independent nation of Bangladesh. When US architect Louis Kahn was commissioned to design it in 1962, however, it was intended to be the eastern headquarters for the government of Pakistan. After separation from Pakistan in 1971, it instead became the parliament building for the new nation, a symbol of democracy and a source of pride for the people of Bangladesh. Kahn used local materials and poured-in-place concrete to create these bold geometric structures. An artificial lake surrounds eight halls that are linked to the central parliamentary chamber.
Photo: 2011, Rossi 101 at English Wikipedia, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 6.10. Ardnacrusha hydroelectric generating station, 1925–29, Ardnacrusha, County Clare, Ireland. When it was completed in 1929, the Shannon Hydroelectric Scheme in western (and newly independent) Ireland was one of the largest civil engineering projects in the world. The Irish Free State invested more than IR£5 million in the scheme—almost one-fifth of its annual budget for 1925. Ardnacrusha, the centerpiece of the scheme, was designed—with assistance from German engineers working for the Siemens Corporation—to generate power sufficient to supply the national electric grid. Beginning in the 1930s, this station provided energy for Ireland's rural electrification, which radically altered people's lives and supported the development of an economically and socially resurgent Ireland.
Photo: 2019, ©Sheridan Burke.

Figure 6.11. United Nations Headquarters, 1948–52, New York, New York, USA. The headquarters of the UN occupies an eighteen-acre (seven-hectare) site along New York's East River, comprising the curving, glass-paneled General Assembly building (visible in lower right foreground of photo); the low, horizontal conference building (lower left foreground); and the thirty-nine-story Secretariat (left). A library was added in 1961. Designed by a number of international architects working under the direction of US-born Wallace Harrison, the complex was largely a compromise between the modernist designs of Oscar Niemeyer of Brazil and Swiss-born Le Corbusier of France, with input from other architects. The complex is recognized worldwide as a symbol of the United Nations.

Photo: 2006, WorldIslandInfo.com, courtesy Wikimedia Commons, CC BY-2.0.

Figure 6.12. European Court of Human Rights, 1989–95, Strasbourg, France. This landmark structure for the "New Europe" that emerged contemporaneously with the dissolution of the communist bloc was designed by British architect Richard Rogers and French architect Claude Bucher in response to the Council of Europe's brief to create a welcoming, humane, and dignified building. The large complex reflects a strong, late twentieth-century European commitment to adjudicating cases involving human rights.

Photo: 2012, CherryX, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 6.13. Robert Sobukwe House, 1963–69, Robben Island, Cape Town, South Africa. In 1959, educator Robert Sobukwe founded the Pan Africanist Congress, which sought to establish African majority rule in South Africa. After being detained for inciting Blacks to disobey discriminatory pass laws, Sobukwe was held in isolation in the maximum security prison on Robben Island from 1963 to 1969. Prohibited from contact, he was housed in Building T159 (shown at far left in photo), from which he could see but not communicate with other prisoners; he eventually developed a system of hand signals. The rows of dog kennels next to the house were built in 1976 for the guard dogs used in surveillance patrols. Robben Island is significant for its association with Sobukwe, Nelson Mandela, and other anti-apartheid activists who were imprisoned there.

Photo: 2018, Daniel Case, courtesy Wikimedia Commons, CC BY-SA 3.0.

Figure 6.14. Little Rock Central High School, 1927, Little Rock, Arkansas, USA. This Gothic Revival–style school was a key location in the battle for school desegregation in the US during the 1950s. In 1954, the Supreme Court ruled against school segregation in the landmark court case known as *Brown v. Board of Education*. Little Rock Central High School, however, resisted integration, and in 1957 angry white protesters barred nine African American students from entering, prompting US president Dwight D. Eisenhower to dispatch military units to protect the students and escort them into the school. In 1982, the school was designated a National Historic Landmark for its role in the civil rights movement.

Photo: Adam Jones, PhD, 2012, courtesy Wikimedia Commons, CC-BY-SA-3.0.

Figure 6.15. Portrait monument to Lucretia Mott, Elizabeth Cady Stanton, and Susan B. Anthony, 1920, Washington, DC, USA. The three women depicted in this sculpture—a symbol of the arduous struggle for equal rights—were pioneers of the suffrage movement that ultimately won American women the right to vote in 1920. It was sculpted by US artist and suffragist Adelaide Johnson from Carrara marble. A gift to the US Capitol from the National Woman's Party, the work was unveiled in the Rotunda in 1921, then immediately moved to the crypt for display until 1997, when it was relocated to the Rotunda.

Photo: 2007, Rebel At, courtesy Wikimedia Commons, CC BY-SA-3.0.

NOTES

1. Richard Overy, *Collins Atlas of 20th Century History* (London: Collins, 2005), 10.
2. Max Roser, "Democracy," Our World in Data, last modified June 2019, https://ourworldindata.org/democracy/.
3. Overy, *Collins Atlas*, 66.
4. *Encyclopedia Britannica*, s.v. "Soviet Union," by John C. Dewdney et al., last modified December 20, 2018, https://www.britannica.com/place/Soviet-Union.
5. Susan E. Reid, "Introduction," in "Design, Stalin and the Thaw," ed. Susan E. Reid, special issue, *Journal of Design History* 10, no. 2 (1997): 107–18.
6. Rasa Čepaitienė, "In the Shadow of Moscow: The Stalinist Reconstruction of the Capitals of the Soviet Republics," *Journal of Architecture and Urbanism* 39, no. 1 (2015): 3–16.
7. Natasa Miskovic, Harald Fischer-Tiné, and Nada Boskovska, eds., *The Non-Aligned Movement and the Cold War: Delhi, Bandung, Belgrade* (London: Routledge, 2014).
8. Max Roser, "Age of Democracies at the End of 2015," Our World in Data, last modified June 2019, https://ourworldindata.org/grapher/age-of-democracies.
9. Ehiedu E. G. Iweriebor, "The Colonization of Africa," Africana Age: African and African Diasporan Transformations in the 20th Century, Schomburg Center for Research in Black Culture, New York Public Library, accessed August 6, 2020, https://wayback.archive-it.org/11788/20200109141010/http://exhibitions.nypl.org/africanaage/essay-colonization-of-africa.html; Alistair Boddy-Evans, "Chronological List of African Independence," ThoughtCo., last modified January 25, 2020, https://www.thoughtco.com/chronological-list-of-african-independence-4070467; and Victoria Brittain, "The 20th Century: Africa," *The Guardian*, January 2, 1999, https://www.theguardian.com/world/1999/jan/02/uganda.westafrica.
10. *Encyclopedia Britannica*, s.v. "Middle East," last modified September 27, 2018, https://www.britannica.com/place/Middle-East; and O'Brien Browne, "Creating Chaos: Lawrence of Arabia and the 1916 Arab Revolt," HistoryNet, accessed March 18, 2020, http://www.historynet.com/creating-chaos-lawrence-of-arabia-and-the-1916-arab-revolt.htm.
11. Margaret MacMillan, *Paris 1919: Six Months That Changed the World* (New York: Random House, 2002).
12. "Decolonization after 1945," The Map as History, accessed January 24, 2020, https://www.the-map-as-history.com/Decolonization-after-1945.
13. Office of the Historian, Foreign Service Institute, US Department of State, "Decolonization of Asia and Africa, 1945–1960," Milestones in the History of U.S. Foreign Relations, accessed March 18, 2020, https://history.state.gov/milestones/1945-1952/asia-and-africa.
14. Boddy-Evans, "Chronological List of African Independence."
15. As of May 2019, the UN lists seventeen non-self-governing territories. United Nations, "Non-Self-Governing Territories," The United Nations and Decolonization, last modified May 14, 2019, https://www.un.org/dppa/decolonization/en/nsgt.
16. David L. A. Gordon, "Capital Cities in the Twentieth Century," in *Planning Twentieth Century Capital Cities*, ed. David L. A. Gordon (London: Routledge, 2006), 1.
17. Lawrence J. Vale, *Architecture, Power, and National Identity* (New Haven, CT: Yale University Press, 1992).
18. On Tropical Modernism, see Ola Uduku, "Modernist Architecture and 'the Tropical' in West Africa: The Tropical Architecture Movement in West Africa, 1948–1970," *Habitat International* 30, no. 3 (September 2006): 396–411.
19. For example, in the work of Sri Lankan architect Geoffrey Bawa. See Patrick Kunkel, "Spotlight: Geoffrey Bawa," *ArchDaily* (blog), July 23, 2019, https://www.archdaily.com/770481/spotlight-geoffrey-bawa.
20. "1918 Pandemic (H1N1 Virus)," Centers for Disease Control and Prevention, last modified March 20, 2019, https://www.cdc.gov/flu/pandemic-resources/1918-pandemic-h1n1.html.
21. Jeffrey Hays, "Trains in China: History, Train Life, New Lines and Great Leap Culture," Facts and Details, last modified April 2012, http://factsanddetails.com/china/cat13/sub86/item315.html.
22. S. G. Foster, Susan Marsden, and Roslyn Russell, *Federation: The Guide to Records* (Canberra: Australian Archives, 1998), 183, 335.
23. "History," Carnegie Foundation Peace Palace, accessed March 18, 2020, https://www.vredespaleis.nl/peace-palace/history/?lang=en.

24. *Encyclopedia Britannica*, s.v. "Le Corbusier, Swiss Architect," by Françoise Choay, last modified October 21, 2019, https://www.britannica.com/biography/Le-Corbusier.

25. "UNESCO in Brief—Mission and Mandate: UNESCO Headquarters," UNESCO, accessed March 18, 2020, https://en.unesco.org/about-us/introducing-unesco.

26. "History," International Federation of Red Cross and Red Crescent Societies, accessed March 18, 2020, https://www.ifrc.org/en/who-we-are/history/.

27. "About Us: History," Blue Shield International, accessed March 18, 2020, https://theblueshield.org/about-us/history/; and "Blue Shield," International Council on Archives, accessed March 18, 2020, https://www.ica.org/en/networking/blue-shield.

28. "Founding," Médecins Sans Frontières—Doctors Without Borders, accessed March 18, 2020, https://www.doctorswithoutborders.org/who-we-are/history/founding.

29. Tove Rosen, ed., "The Influence of the Nuremberg Trial on International Criminal Law," Robert H. Jackson Center, accessed March 18, 2020, https://www.roberthjackson.org/speech-and-writing/the-influence-of-the-nuremberg-trial-on-international-criminal-law/; and "About: History," International Criminal Court, accessed March 18, 2020, https://www.icc-cpi.int/about.

30. David Armitage, "The Declaration of Independence: The Words Heard around the World," *Wall Street Journal*, July 3, 2014, https://www.wsj.com/articles/the-declaration-of-independence-the-words-heard-around-the-world-1404415089.

31. Suzanne Miers, *Slavery in the Twentieth Century: The Evolution of a Global Problem* (Walnut Creek, CA: AltaMira Press, 2003), xii.

32. "History of the ILO," International Labour Organization, accessed March 18, 2020, https://www.ilo.org/global/about-the-ilo/history/lang--en/index.htm; and UN General Assembly, Resolution 217A, Universal Declaration of Human Rights, Article 23 (December 19, 1948), https://www.un.org/en/universal-declaration-human-rights/.

33. *Encyclopedia Britannica*, s.v. "Women's Suffrage," last modified February 24, 2020, https://www.britannica.com/topic/woman-suffrage; and Wikipedia, s.v. "Women's Suffrage," last edited March 16, 2020, https://en.wikipedia.org/wiki/Women%27s_suffrage.

34. *Encyclopedia Britannica*, s.v. "Dowry Prohibition Act: India (1961)," by Sharmila Lodhia, last modified April 24, 2019, https://www.britannica.com/event/Dowry-Prohibition-Act; and Himanshi Nagpal, "The Historical Journey of Anti-Dowry Laws," *Feminism in India* (blog), June 21, 2017, https://feminisminindia.com/2017/06/21/historical-journey-anti-dowry-laws/.

35. Yulia Nesterova, "Indigenous Peoples and Their Rights: How They Started, Why They Matter," *Impakter* (blog), August 28, 2017, https://impakter.com/indigenous-peoples-part-one/.

36. UN General Assembly, Resolution 61/295, United Nations Declaration on the Rights of Indigenous Peoples, A/RES/61/295 (September 13, 2007), https://www.un.org/development/desa/indigenouspeoples/declaration-on-the-rights-of-indigenous-peoples.html

Theme 7

Conserving the Natural Environment, Buildings, and Landscapes

Parallel movements advocating for the preservation and protection of historic buildings and natural landscapes emerged in the nineteenth century and came to fruition in the following century, when sustained community activism came to play an often critical role in forcing governments to take positive action regarding conservation.* These movements were also sparked by architects, archaeologists, town planners, environmentalists, scientists, and other professionals. In the twentieth century, conservation action was institutionalized at the local, national, and international levels. This institutionalization led to formal legislation and the establishment of protective mechanisms to identify heritage places for protection and set new standards for conservation.

The brief overview that follows encompasses recognition of the impacts of environmental destruction and the need for nature conservation, cultural preservation prompted by citizen and professional action, and international cooperation to protect both cultural and natural heritage.

An Evolving Framework for Conservation

The celebration of heritage places, traditional practice, and interactions with nature are fundamental to all cultures. Most societies have a long history of recording oral narratives and family histories; preserving prized documents, artifacts, buildings, and sites; and safeguarding nature. Such customary heritage practices evolved throughout the twentieth century. They grew in strength when supported (e.g., by public or philanthropic funding or in formal education) and declined when either disrupted (by such events as war or market pressures) or suppressed (by authoritarian regimes, imperial powers, and dominant cultural groups).

*Usage of the terms *preservation* and *conservation* varies from place to place. In many parts of the world, *conservation* is used to describe the treatment of both natural and cultural heritage. In others, *preservation* is applied to built heritage, while *conservation* refers to natural heritage. The terms are used interchangeably in this essay.

In Europe and North America, the conservation of "nature" and the conservation of "culture" were distinct domains that required different legislative frameworks, though in some early cases, governments embraced both natural and cultural heritage. For example, Parks Canada (founded 1911), the first national government agency devoted to conservation, focused on both natural and historical places, as did Britain's nonprofit National Trust (1895), serving England, Wales, and Northern Ireland.

Conservation action unfolded in three main phases, each marked by shifts in philosophy and differences between Western and other concepts of heritage. During the nineteenth century, a concern for heritage arose in Europe and North America based on Enlightenment concepts of the responsibilities of the public sphere (reflected in use of the word *trust* in the names of heritage organizations). A second phase, during the mid-twentieth century, was characterized in many nations by an increase in civic action and in state regulation of heritage identification and management. The third phase saw the emergence of the concept of world heritage, which recognized a common cultural and natural heritage and was institutionalized in the 1972 UNESCO World Heritage Convention. The convention charged national governments, known as States Parties, with enacting the "appropriate legal, scientific, technical, administrative and financial measures necessary for the identification, protection, conservation, presentation and rehabilitation of this heritage."[1] It also established the World Heritage List (WHL) of properties that possess outstanding universal value (discussed further below). Other international agreements concerned with environmental and cultural protection and promotion were also enacted.

Environmental Destruction and Growing Momentum for Nature Conservation

Concerns about the loss of wilderness, plants, and animals; threats to the environment caused by urban encroachment; and expanding agriculture, mining, and resource extraction prompted the formation of nature clubs and protected areas, including national parks. National parks were initially established in the latter part of the nineteenth century to protect places of scenic beauty, historic importance, or both. Yellowstone National Park, established by the US government in 1872, is widely regarded as the first such park in the world. By 1916, when the US National Park Service was created, Congress had already designated thirty-five national parks and monuments.[2] European nations followed suit in their own countries as well as in their colonial territories: Australia's Royal National Park was one of the earliest, established in 1879; Albert National Park, named for the Belgian king, was founded in the Belgian Congo in 1925 (renamed Virunga National Park in 1969 and inscribed on the WHL in 1979); and Hailey National Park (now known as Jim Corbett National Park) opened in British India in 1936. Japan established its first national parks in 1931 to protect the scenic coastal region around Setonaikai and the mountainous areas in Unzen Amakusa and Kirishima.[3]

National parks were created in many former colonies after independence. In 1926, the Parliament of the Union of South Africa combined two game reserves to create Kruger National Park, South Africa's first. Public and private landholders elsewhere also converted game and forest reserves and farmland to nature reserves. From the 1960s onward, new parks aimed to conserve biodiversity and protect threatened landscapes and ecosystems. These included marine reserves such as Great Barrier Reef Marine Park in Australia (established 1975, inscribed WHL 1981).

Negative impacts began to emerge. Many nature reserves allowed fishing, herding, and hunting, among other traditional human practices, and these came into conflict with conservation principles. Development also posed threats to nature reserves. Occasionally, natural parks were created within urban contexts, such as the Pedregal de San Ángel ecological reserve, established on the campus of the National Autonomous University of Mexico (UNAM) in Mexico City.[4]

As a whole, there were serious consequences for heritage and the environment from the exponential economic growth, rapid urbanization (for more on the effects of urban growth, see theme 1), and accelerated technological and industrial development (for more on the effects of scientific and technological change, see theme 2) over the course of the twentieth century. Environmental damage due to human activity manifested in two main forms: physical destruction, including the extinction of flora and fauna, and pollution caused by toxic chemicals, plastics, and rising levels of carbon in the atmosphere on both the local and, for the first time in history, global levels. The extraction of natural resources also wrought both physical destruction and pollution.

Human activity led to environmental and industrial disasters on a previously unheard-of scale. One of the twentieth century's worst industrial accidents, which took a devastating toll on both the environment and human life, occurred in 1984 in the city of Bhopal, India. A Union Carbide pesticide plant released some forty tons of poisonous gas into the atmosphere, killing at least three thousand people within several days (the exact number is unknown, and estimates vary widely). Since then, thousands more in the area of Bhopal have died of complications related to gas exposure. Far more were left with lifetime injuries and debilitating health conditions affecting not only those exposed but their descendants as well. Thirty-five years after the disaster, the site remains a toxic hazard. No cleanup efforts have been made, the groundwater is still contaminated, and people continue to inhabit adjacent neighborhoods.[5]

The detonation of nuclear bombs at Hiroshima and Nagasaki, Japan, in August of 1945 revealed the enduring harm caused by such a massive release. Subsequently, accidents at nuclear power complexes also released destructive radioactivity. The earliest known accidents occurred in 1957 and are among the most serious: in Russia, the Kyshtym explosion contaminated 20,000 square kilometers and affected an estimated 270,000 people, and a fire at the Windscale reactor facility in Cumbria, England, caused a release of radioactivity that spread across the UK and Europe. Other devastating nuclear disasters took place at Three Mile Island power plant near Middletown, Pennsylvania, in 1979, and in 1986 at the Chernobyl power plant in Ukraine, then part of the USSR.[6]

Such events contributed to a rising awareness, emerging at midcentury, of the need to protect the environment. When humanity witnessed the astronauts' view of Earth in the 1960s, seeing the awe-inspiring images of the planet for the first time inspired global environmental action, assisted later by alarming environmental data collected by satellites. Initially, research locations around the world and, from the 1970s, sensors on earth-orbiting satellites identified changes to the ozone layer and temperature (climate change) that were increasingly affecting natural and human environments across the planet.

Rachel Carson's book *Silent Spring* (1962) focused public attention on the poisoning of the environment due to unrestrained use of persistent chemicals. By the late twentieth century, the vast scope of damage caused by continually rising use of toxic chemicals included widespread impairment of the health of humans and both wild and domesticated animals, as well as contamination of the entire food chain.

Many citizens supported direct-action environmental groups at the international level, including the World Wildlife Fund (founded 1961), Greenpeace (founded by Canadian activists in 1971), and a new Green Party political movement. The United Tasmania Group in Australia was the world's first green party, launched in 1972 to oppose construction of a dam on Lake Pedder in the Tasmanian wilderness. The West German Green Party was the first to run in a national election in 1980, followed by green parties in Canada, Finland, Australia, and elsewhere.

By 2000, concern about the environment had grown to the point that a total of five thousand environmental groups in 184 nations engaged hundreds of millions in the annual Earth Day celebration. Earth Day originated in 1970 in the US, drawing on the experience of antiwar activism to raise public awareness of environmental problems. It became global in 1990, helping to pave the way for the pivotal United Nations Earth Summit in Rio de Janeiro, Brazil, in 1992.[7]

Preservation of Cultural Heritage at the Local and National Levels

An ever-increasing number of community activists and civil organizations encouraged the conservation of heritage places and natural and cultural landscapes such as designated parks and botanical gardens. National organizations concerned with the preservation of cultural or natural heritage were established in Europe and the US in the nineteenth century. Britain's National Trust (see above) became one of the world's largest member-based conservation organizations and served as a model for others, including the National Trust of Australia (dating from 1947 in New South Wales), the National Trust for Historic Preservation (US, 1949), and the Japan National Trust (1968).

In the early twentieth century, community concerns manifested in campaigns surrounding specific locales, such as the 1925 Bath Corporation Act, which, among other things, instituted aesthetic controls in that English city and served as a model for others.[8] Much organized heritage action dated from around the 1950s, with a significant increase later in the century.

During the two world wars, damage to the built environment occurred on an unprecedented scale (for more on postwar reconstruction, see theme 10). While many cities proceeded to rebuild according to modern planning principles, some locales meticulously reconstructed historic buildings and urban districts in an effort to reclaim their lost heritage, notably Ypres, France, following World War I, and eastern and central European cities, including Warsaw, Poland, and Dresden, Germany, following World War II (WWII). In Germany, a new wave of such reconstructions began around 1980, resulting in the replacement of postwar modernist buildings with replicas of the destroyed buildings they had, in fact, replaced.[9]

Government heritage action varied by political and economic systems and geographic region. State-controlled heritage conservation and the construction of monuments had a significant role in communist nations. Heritage was used to help reeducate people as communist citizens, and in some respects, protecting it was one of the historical stages through which a new society evolved—two fundamental concepts in Marxist-Leninist ideology.[10] However, the issue of what kind of heritage to target for preservation was complex because some places were perceived by authorities to be "incorrigibly pervaded by hostile value-systems—religion, feudalism and the bourgeoisie."[11] Thus, some historic areas were either destroyed or left to atrophy, while others were redeveloped and selectively retained to serve the communist cause.

In Western democracies, government action was often preceded by the efforts of national trusts and other nonprofit civil groups, by actions taken in single-issue public campaigns, or in response to the loss of heritage places. Around midcentury, town planning projects and transport redevelopment schemes that predated heritage legislation frequently involved the demolition and redevelopment of historic urban districts, a process known as urban renewal or urban regeneration. Community advocates and heritage activists battled to save inner cities, iconic buildings, and green spaces from destruction and redevelopment. Gradually, heritage legislation was introduced in the 1960s and 1970s. For instance, following the demolition of Pennsylvania Station, the New York City Landmarks Law was passed in 1965 to conserve the city's architectural heritage; by the early twenty-first century, almost 30 percent of Manhattan's buildings were protected.[12] Along with the growth of preservation legislation, an industry of professional heritage specialists emerged.

Heritage preservation is a way of forming or expressing both local and national identity, and its rehabilitation and reconstruction also has economic benefits. In the late 1920s, for instance, the extensive reconstruction of Colonial Williamsburg, Virginia (US), was an expression of national pride as well as a popular tourist attraction (for more on the expansion of cultural institutions, see theme 9). As the century advanced and heritage tourism became a global phenomenon, many places undertook the reconstruction and renovation of districts containing historic properties in order to generate greater revenue and to celebrate national identity, as Singapore did with the rehabilitation of its shophouses beginning in the 1980s. Some redundant inner-city ports were redeveloped as "dockland" sites replete with shops, restaurants, and high-end, water-view apartments in repurposed wharves, Puerto Madero in Buenos Aires, Argentina, being an example.[13] Many of the world's major ports offer maritime museums that feature exhibits on the movement of people and the trade of major goods, giving visitors a sense of what the old port was like (for more on the evolution of port landscapes, see theme 4).

By the end of the century, the conservation of built heritage had "become a driver of change in its own right, providing channels for public education, economic development and regeneration."[14] However, in cities facing both population growth and rising property values, demolition was rife. One solution proved to be the growing practice of adaptive reuse: adapting existing buildings for new purposes. Though countless buildings have been given new uses since time immemorial, by the 1960s the practice was making its way into both international heritage charters and national and local legislation.

International Efforts to Protect Natural and Cultural Heritage

Up until the 1950s, action to conserve built heritage was largely restricted to local or national groups and governments, except in the case of global religious organizations that protected their own heritage, such as the complexes maintained in many countries by Roman Catholic monastic orders. Cultural internationalism was, however, a twentieth-century phenomenon, originating with the International Committee on Intellectual Cooperation of the League of Nations (founded 1922), which in 1926 set up the International Museums Office (IMO) to foster cooperation among museums. The concept of a common human heritage and the need for international collaboration in its protection were introduced at the Athens Conference on the Restoration of Historic Buildings (1931), organized by the IMO.[15]

The outcome of WWII helped advance the concept of international cooperation to protect natural and cultural heritage. This came about through international agreements, the formation of international networks, and the creation of the United Nations (UN) and its agencies, most notably UNESCO, formed in 1945, the same year as the UN itself (for more on the establishment of international organizations, see theme 6). In 1951, UNESCO resolved to establish an international center to encourage the study and awareness of methods of conservation on a global scale. The result was the birth of ICCROM (the International Centre for the Study of the Preservation and Restoration of Cultural Property) in Rome, Italy, in 1959.

At the Second International Congress of Architects and Technicians of Historic Monuments, held in Venice, Italy, in 1964, text was drafted that would become the International Charter for the Conservation and Restoration of Monuments and Sites (commonly known as the Venice Charter, 1964). The Congress also endorsed UNESCO's recommendation for the creation of ICOMOS (the International Council on Monuments and Sites), which was established as an NGO in 1965. ICOMOS adopted the Venice Charter in 1965 and swiftly forged an extensive professional network of national and scientific committees.

Many postwar international agreements sought to protect the natural environment. The impact of one early agreement, the International Convention for the Regulation of Whaling (1946), was evident in the revival of a number of whale species; it left a heritage of abandoned whaling stations and relics. The International Union for Conservation of Nature (IUCN), created in 1948 as a membership organization that included governments and civil society groups, became the world's largest environmental network.[16] The Antarctic Treaty (entered into force in 1961) declared freedom of scientific investigation for an entire continent and its ice shelves and seas, and confirmed the scientific collaboration established by the twelve nations active in Antarctica during the International Geophysical Year (1957–58), an international scientific project in which sixty-seven countries participated.

In step with the internationalization of heritage, traditional institutions such as zoos and museums, many established in earlier centuries, were also transformed. Zoos transitioned from simply displaying wild-caught animals to collaboratively breeding endangered species and reintroducing them to their native habitats. This approach was led by Jersey Zoo in the British Isles (1959), which in 1972 hosted the first World Conference on Breeding Endangered Species in Captivity.

UNESCO played an active role in establishing support for world heritage, defined by the organization as "places on Earth that are of outstanding universal value to humanity."[17] This includes cultural, natural, and mixed sites. One of UNESCO's most important initial actions was its call for the safeguarding of the ancient Abu Simbel and Philae temples in Egypt, a twenty-year campaign begun in 1959. When construction of the Aswan High Dam was planned, surveys of the area to be flooded revealed rich archaeological sites. Most were inundated, together with many living communities, but between 1964 and 1968, with help from an international fundraising campaign, UNESCO led a team that disassembled the ancient temples and reconstructed them on higher ground. The massive project drew unprecedented global attention to the need for international action and cooperation to protect other sites of significant cultural heritage.

The World Heritage Convention, adopted by UNESCO in 1972, came into force in 1975; ICOMOS, IUCN, and ICCROM were validated as advisory bodies to assist in its implementation. The convention linked

the protection of both natural and cultural heritage in one document, and established a list of properties—the World Heritage List—that possess outstanding universal value. The ten World Heritage selection criteria are expressed as either cultural or natural, but as early as 1979, States Parties began to nominate sites that met a mix of these criteria.[18] By century's end, some twenty-four sites had been inscribed as "mixed" properties.[19]

The understanding of heritage expanded in the last quarter of the twentieth century to encompass a widening range of places, landscapes, and objects, including cultural landscapes and intangible cultural expressions and practices. It also meant recognizing sites of painful memories as well as places of significance to Indigenous peoples, social minorities, and migrant diasporas. This evolution is seen in the development of national principles such as the Burra Charter (1979); reflections such as the Nara Document on Authenticity (1994); programs like UNESCO's Memory of the World; and passage of the 2001 Convention on Underwater Cultural Heritage and the 2003 Convention for the Safeguarding of Intangible Heritage. All represent a growing recognition of the varieties of heritage, both tangible and intangible, how to protect them, and the need for conservation practices to take into account "the varying traditions, varying types of monuments, and varying environments of all peoples."[20]

In 1992, the World Heritage Committee recognized "cultural landscapes" as a category of World Heritage List sites; by then "many people, recognizing humanity's near all-pervasive environmental influence, are coming to see much of the world's terrestrial surface as, to a greater or lesser extent, a 'cultural landscape.'"[21] Such cultural landscapes also included entirely new land surfaces and uses on newly reclaimed land, such as the Noordoostpolder tulip fields, in the Netherlands, located on land that was once the bottom of the Zuiderzee, and marinas and residential and industrial regions built on reclaimed land worldwide. By 2000, 690 sites of exceptional universal value in 122 countries had been inscribed on the World Heritage List.[22]

In the second half of the century, international agreements were developed to address global environmental problems. In June 1972, in Stockholm, Sweden, the Declaration of the United Nations Conference on the Human Environment established a precedent that was followed twenty years later in Rio de Janeiro, Brazil, when the United Nations Conference on Environment and Development issued the Rio Declaration on Environment and Development. This declaration asserts that because humankind is primarily concerned with sustainable development, states are responsible for fulfilling developmental and environmental needs, and should assist developing nations that are environmentally vulnerable. It also calls for the implementation of environmental legislation to address the problems of environmental degradation, focusing not only on species and habitats but also on ecosystems.[23]

The Ramsar Convention on Wetlands, one of the first global intergovernmental environmental agreements, was negotiated by nations and NGOs concerned over the loss of wetland habitat for migratory waterbirds. Adopted in the Iranian city of Ramsar in 1971, the convention came into force in 1975. By the 1990s, Ramsar's writ covered 75 percent of the world's land area.[24] Ramsar paved the way for many subsequent agreements for environmental conservation and sustainable development. The Montreal Protocol on Substances that Deplete the Ozone Layer, signed in 1987, had, by the turn of the century, discernibly begun to reverse damage to the ozone layer caused by industrial gases, notably chlorofluorocarbons.

What started at the beginning of the twentieth century as largely uncoordinated and mainly localized community attempts to save important heritage and natural places had expanded by the dawn of the twenty-first. Sustained, coordinated efforts to understand and preserve national heritage sites also helped to nurture a growing international consciousness, nowhere better reflected than in the World Heritage List. Efforts also focused on broader issues, such as preserving human settlements and the sustainability of ecosystems, and were taking place with international cooperation at a worldwide level. In 1978, the United Nations created its Human Settlements Programme (also known as UN-Habitat), which grew out of the UN's first conference on human settlements and sustainable urban development, held in Vancouver, Canada, in 1976, and known as Habitat I. Habitat II was organized in Istanbul, Turkey, in 1996.

In 1983, the UN established the World Commission on Environment and Development (now the Brundtland Commission) to rally countries to pursue sustainable development together, releasing *Our Common Future,* or the Brundtland Report, in October 1987.[25] The document defined and popularized the term *sustainable development*, a concept based on economic growth, environmental protection, and social equality that was widely supported in concept but not in practice. By the end of the century, the cumulative inheritance of the impacts of development decisions on the earth's environment—climate change—was beginning to be recognized as a universal fact of life to be addressed in the twenty-first century.

Photo Gallery

The table below lists a selection of subthemes and types of places related to theme 7 and is excerpted from "Twentieth-Century Themes, Subthemes, and the Places That Exemplify Them" (see pp. 10–15). It is followed by a gallery of photos showing a diverse range of buildings, sites, structures, and landscapes from around the world that exemplify the issues and subthemes discussed. The text accompanying each photo explains how that place represents the theme of the preceding essay. Some of these places may already be listed as heritage places (from local inventories to the World Heritage List) while others are not, though they *may* be identified as significant in the future. Some are specifically mentioned in the text; many are not. All are included here as exemplars to prompt broad exploration of potential heritage places.

Theme 7	CONSERVING THE NATURAL ENVIRONMENT, BUILDINGS, AND LANDSCAPES
Subthemes	**Types of Places**
• Development of government conservation legislation and regulations • Growth of civil society conservation organizations • Growth of community advocacy and activism • Conserving natural places • Accelerated pollution and environmental destruction • Conserving cultural heritage • Professionalization of heritage protection • Reconstruction of historic sites • International cooperation in conservation • Broadening of the definition of *heritage* • Sustainable development	• National parks • Nature reserves • Marine reserves • Sites of environmental destruction (natural or human made) • Protected built heritage • Reconstructed historic sites and districts • Adaptively reused older buildings, spaces, structures, and infrastructure • Museums and visitor centers at heritage sites and natural areas • Abandoned sites and ruins • Sites associated with painful memories or social minorities

▲ **Figure 7.1. Kruger National Park, 1926, South Africa.** Two older game reserves were combined to form South Africa's first national park during the postcolonial period of the South African Union. The park's primary purpose is nature conservation, though construction of visitor facilities and road networks began soon after it was created. Hunting is prohibited in Kruger and in all South African national parks, in keeping with the principles of conserving biodiversity and protecting the natural ecosystem. Kruger is one of Africa's largest game reserves.

Photo: 2007, Entropy1963, courtesy Wikimedia Commons, public domain.

◀ **Figure 7.2. Iguazú and Iguaçu National Parks, 1934 (Iguazú) and 1939 (Iguaçu), Iguazu River, Argentina and Brazil.** Nature clubs and parks were formed in many place to protect the wilderness against a variety of destructive factors, from urbanization to increasing demand for natural resource extraction. In these two parks, through an international agreement, Brazil and Argentina oversee protection of the world's largest waterfall system (pictured here from the Brazilian side) and its surrounding subtropical rainforest, home to many rare and endangered species of flora and fauna. Both were designated UNESCO World Heritage Sites, Iguazú in 1984 and Iguaçu in 1986.

Photo: 2005, Patrick Nouhailler, courtesy Wikimedia Commons, CC BY-SA 3.0.

▲

Figure 7.3. Union Carbide plant (abandoned), 1984, Bhopal, Madhya Pradesh, India. The Bhopal disaster, also referred to as the Bhopal gas tragedy, involved a gas leak incident in December of 1984 at the Union Carbide India Limited pesticide plant. At the time, it was considered the world's worst industrial disaster. Toxic gas escaped from the plant and spread to many surrounding small towns and villages. The death toll is estimated in the thousands. Half a million survivors suffered respiratory problems, eye irritation or blindness, and other maladies resulting from exposure to the gas. As of April 2020, the site remains a toxic hazard.

Photo: 2010, Julian Nitzsche, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 7.4. Castle Square, Historic Center of Warsaw, 1945–51, Warsaw, Poland. Following the damage caused by WWII, some historic districts were meticulously reconstructed as the recognition of heritage places became integral to rebuilding national identity. The Old Town of Warsaw had been the center of the city since its establishment in the thirteenth century. Over the years, it underwent several phases of modification and development until its near-complete destruction by a succession of German bombing campaigns. Where possible, original bricks were used for the reconstruction, and any surviving decorative elements were reinstated in their original positions.

Photo: 2011, Adrian Grycuk, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 7.5. Colonial Williamsburg, 1920s–1930s, Williamsburg, Virginia, USA. Colonial Williamsburg is the twentieth-century interpretation of a colonial American city, evoking the atmosphere and lifestyle of eighteenth-century America. Surviving buildings from this era were restored where possible, and previously lost buildings were re-created. From the 1930s on, Colonial Williamsburg was a popular tourist destination, offering both a scholarly and picturesque presentation of early American life through its re-created and restored architecture and landscapes. Costumed interpreters roam about, re-enacting scenes of daily life and historic events.

Photo: 2011, Albert Herring, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 7.6. Weald and Downland Open Air Museum (now Weald and Downland Living Museum), opened 1970, Singleton, Chichester, West Sussex, England. This living museum, operated by a nonprofit educational charity trust, was established to foster public interest in both the conservation of significant historic buildings and the perpetuation of preindustrial crafts and trades. Of note is a collection of regionally significant historic buildings, rescued from demolition, moved, and set in period gardens rooted in a rural landscape. Site interpretation brings to life a series of rural industries and highlights traditional building construction through collections, exhibitions, and active educational programs for children and adults. Here, reenactors in Tudor dress practice ancient straw-working techniques in front of a fifteenth-century house.

Photo: 2009, Anguskirk, courtesy Flickr, CC BY-NC-ND 2.0.

Figure 7.7. Puerto Madero, redeveloped 1990s, Buenos Aires, Argentina. Like many nineteenth-century port facilities, Puerto Madero, on the Rio de la Plata riverbank in Buenos Aires, was unable to accommodate cargo ships as they increased in size in the twentieth century. After a new port was constructed in 1926, Puerto Madero fell into disuse and decay. In 1989, the federal and city governments rehabilitated these unused brick warehouses into housing, offices, hotels, restaurants, and a private university, adding a waterfront promenade. Today it lies at the core of one of the most popular neighborhoods in Buenos Aires.

Photo: 2006, Remi Jouan, courtesy Wikimedia Commons, CC BY-SA-3.0.

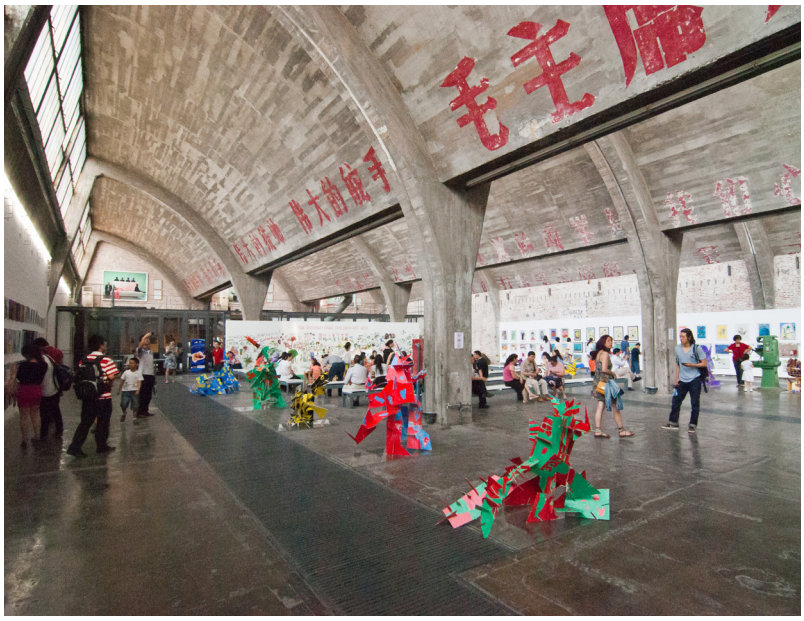


Figure 7.8. 798 Art Zone (also known as Dashanzi Art District), 1950s–1990s, Beijing, China. This art district inhabits a complex of decommissioned factory buildings that once produced electronic equipment for both military and civilian purposes. In the mid-1990s, Beijing's Central Academy of Fine Arts began using one of the vacant structures, and members of the artistic community soon followed. The 798 Space Gallery, seen here, opened in 2002. When this building was adapted for its new use, the Maoist slogans on the ceiling were preserved.

Photo: 2011, Leeluv, courtesy Wikimedia Commons, CC BY-SA-3.0.

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Figure 7.9. Grytviken whaling station, 1904–66, Grytviken, South Georgia Island, British Overseas Territory. Commercial whaling was limited and eventually banned by environmental agreements, reviving some whale species and leaving a heritage of abandoned whaling stations and relics. After sixty-two years of operation, Grytviken whaling station ceased production in 1966 following depletion of the whale population. During that time, an estimated nine million barrels of whale oil were produced at the site. Several species have gradually returned to the area, and the abandoned station has become a tourist attraction.

Photo: 2013, Gregory "Slobirdr" Smith, courtesy Flickr, CC BY-SA-2.0.

Figure 7.10. The Stonewall Inn, 1969, New York, New York, USA. This unassuming structure, a gay bar in a nineteenth-century building in lower Manhattan, is a key symbol of the community's struggle for human rights and equal treatment. In 1969, homosexuality was illegal and discrimination was widespread. As part of a pattern of harassment, police raided the Stonewall in June, but patrons and neighborhood residents resisted, leading to several days of protest. This event is seen as a turning point in the struggle for LGBTQ rights. The designation in 2016 of the Stonewall National Monument, which includes the bar and several other sites, reflects the late twentieth-century expansion of the understanding of what constitutes heritage.

Photo: 2008, Johannes Jordan, courtesy Wikimedia Commons, CC-BY-SA-3.0.

NOTES

1. UNESCO, Convention Concerning the Protection of the World Cultural and Natural Heritage, Article 5(d) (November 16, 1972), available at https://whc.unesco.org/en/conventiontext/.
2. "Quick History of the National Park Service," National Park Service, US Department of the Interior, last modified May 14, 2018, https://www.nps.gov/articles/quick-nps-history.htm.
3. "Brief Overview of National Parks of Japan," Encyclopedia Japan, accessed September 2019, http://doyouknowjapan.com/nationalpark/.
4. SEREPSA (Secretaría Ejecutiva de la Reserva Ecológica Pedregal de San Ángel), "Portal oficial de la Reserva Ecológia del Pedregal de San Ángel," Coordinación de la Investigación Científica, Universidad Nacional Autónoma de México (UNAM), accessed June 5, 2018, http://www.repsa.unam.mx/.
5. Hannah Ellis-Petersen, "'Bhopal's Tragedy Has Not Stopped': The Urban Disaster Still Claiming Lives 35 Years On," *The Guardian*, December 8, 2019, https://www.theguardian.com/cities/2019/dec/08/bhopals-tragedy-has-not-stopped-the-urban-disaster-still-claiming-lives-35-years-on?utm_term=RW%E2%80%A6; and Apoorva Mandavilli, "The World's Worst Industrial Disaster Is Still Unfolding," *The Atlantic*, July 10, 2018, https://www.theatlantic.com/science/archive/2018/07/the-worlds-worst-industrial-disaster-is-still-unfolding/560726/.
6. Jan Haverkamp, "'...People Have Become a Sort of Radioactive Waste,'" *Nuclear Reaction* (blog), Greenpeace International, September 29, 2017, http://www.greenpeace.org/international/en/news/Blogs/nuclear-reaction/Mayak-anniversary-radioactive-waste-rosatom/blog/60344/; and "Timeline: Nuclear Plant Accidents," *BBC News*, September 12, 2011, http://www.bbc.com/news/world-13047267.
7. "The History of Earth Day," Earth Day Network, accessed January 2019, https://www.earthday.org/about/the-history-of-earth-day/.
8. Robin Lambert, "The Bath Corporation Act of 1925," *Transactions of the Ancient Monuments Society* 44 (2000): 51.
9. Leo Schmidt, "Back to the Future—Forward to the Past: Replacing Modernist Buildings with Reconstructions," *Historic Environment* 25, no. 1 (2013): 32–45.
10. See Catriona Kelly, "The Shock of the Old: Architectural Preservation in Soviet Russia," *Nations and Nationalism* 24, no. 1 (2018): 88–109.
11. Miles Glendinning, *The Conservation Movement: A History of Architectural Preservation: Antiquity to Modernity* (Abingdon, UK: Routledge, 2013), 360.
12. Nick Bryant, "How Penn Station Saved New York's Architectural History," *BBC News*, May 28, 2015, http://www.bbc.com/news/magazine-32890011. One of the most vociferous advocates for the preservation of historic buildings in the city of New York was Jane Jacobs, whose book *Death and Life of Great American Cities* (1961) was an important catalyst for citizen engagement.
13. Ann Breen and Dick Rigby, *The New Waterfront: A Worldwide Urban Success Story* (London: Thames and Hudson, 1996).
14. A. Bradley, V. Buchli, G. Fairclough, D. Hicks, J. Miller, and J. Schofield, *Change and Creation: Historic Landscape Character 1950–2000* (London: English Heritage, 2004), 1, https://historicengland.org.uk/images-books/publications/change-and-creation-historic-landscape-character/.
15. First International Congress of Architects and Technicians of Historic Monuments, The Athens Charter for the Restoration of Historic Monuments, 1931, https://www.icomos.org/en/charters-and-texts/179-articles-en-francais/ressources/charters-and-standards/167-the-athens-charter-for-the-restoration-of-historic-monuments.
16. "About," International Union for Conservation of Nature, accessed January 2019, https://www.iucn.org/about.
17. "What Is World Heritage?," UNESCO World Heritage Centre, accessed June 29, 2019, https://whc.unesco.org/en/faq/19.
18. UNESCO, "Item 9 of the Provisional Agenda: Global Strategy for a Representative, Balanced and Credible World Heritage List, 9B: Reflections on Processes for Mixed Nominations," Convention Concerning the Protection of the World Cultural and Natural Heritage, WHC-14/38.COM/9B (April 30, 2014), https://whc.unesco.org/document/128806.

19. "World Heritage List," UNESCO World Heritage Centre, accessed October 16, 2016, https://whc.unesco.org/en/list/?order=year&type=mixed.
20. Charles S. Rhyne, "The First International Document for Diverse Cultural Values in Conservation: 'The Document of Nara'" (paper presented at the Annual Meeting of the American Institute for the Conservation of Historic and Artistic Works, St. Paul, Minnesota, June 7, 1995), http://www.reed.edu/art/rhyne/papers/first.html. See also UNESCO, ICCROM, and ICOMOS, The Nara Document on Authenticity (1994), https://www.icomos.org/charters/nara-e.pdf.
21. P. J. Fowler, *World Heritage Cultural Landscapes: 1992–2002*, World Heritage Papers 6 (Paris: UNESCO World Heritage Centre, 2003), 7, 15, https://unesdoc.unesco.org/ark:/48223/pf0000133121.locale=en.
22. UNESCO World Heritage Centre, "World Heritage Committee Inscribes 61 New Sites on World Heritage List," news release, November 30, 2000, https://whc.unesco.org/en/news/184.
23. UNESCO, The Rio Declaration on Environment and Development (1992), https://web.archive.org/web/20190321151621/www.unesco.org/education/pdf/RIO_E.PDF.
24. G. V. T. Matthews, *The Ramsar Convention on Wetlands: Its History and Development* (Gland, Switzerland: Ramsar Convention Bureau, 1993, 2013), 4. Citations refer to the 2013 edition. https://www.ramsar.org/sites/default/files/documents/pdf/lib/Matthews-history.pdf.
25. World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987).

Theme 8

Popular Culture and Tourism

Over the course of the twentieth century, as many societies experienced higher living standards, people attained increased access to recreation and to better services in public health and education, as well as more time for personal leisure. They had greater opportunities to participate in popular cultural activities or to purchase commercial products that provided entertainment. As popular forms of communication were becoming more globalized, what was a prevalent practice, image, or commodity in one cultural context became increasingly appealing in other contexts.

Although people had endured wars, epidemics, and economic depressions in their own way, they shared a common desire for relief from life's hardships in places and activities related to popular culture: sports fields and stadiums, amusement parks, music festivals, casinos, and racetracks, to name a few. Those who preferred more intimate entertainment within changing domestic spaces initially turned to radios and record players and, later, televisions and digitized technologies.

People increasingly ventured beyond their local contexts in search of a broader range of travel destinations. This trend was facilitated by changing forms of public transportation, the rise of auto-based travel and affordable air travel, the proliferation of facilities catering to the tourist trade, and the cooperation of governments in easing access to increasingly far-flung locales. By the end of the century, tourism was becoming so popular that many places were experiencing greater risks from what came to be known as mass tourism.

Growing Access to Leisure

At the beginning of the twentieth century, the ability to pursue leisure activities or to travel was enjoyed primarily by people of significant economic means, though in many places the working class had begun to organize, demanding better pay and working conditions and shorter hours. As higher pay, reduced hours, public holidays, and weekend days off were gradually gained, wage workers were able to partake of a growing range of activities in their free time. Leisure, however, remained an

illusory notion for many, including the working poor, the unemployed, itinerant workers, farmers, and people living in agrarian societies. Much work continued to be carried out within the family on farms and in small businesses with little or no oversight of working hours or conditions and no vacation or holiday leave.

With the increase in leisure time and paid vacation in some regions, popular pastimes attracted more participants. Many activities came at minimal or no cost. Outdoor recreation in urban areas relied on access to public lands set aside for that purpose, from parks and playgrounds to sporting fields. In some societies, the public had only very limited access to urban park lands, especially those that were controlled by the military or were the preserve of the monarchy. Residents of Tokyo, Japan, for instance, were able to access the Shinjuku Gyoen royal park lands only after 1949, when they were transferred to public use partly in response to the democratization of the country after its defeat in World War II (WWII).[1] Other activities were more costly and only the relatively wealthy could afford them. Differential affluence had a direct bearing on the growth in popularity of specific sports and activities such as golf, rowing, sailing, and skiing.

As "time off" became an increasingly important part of people's lives in many parts of the world, the range of options expanded to include new types of commercial amusements. New modes of transportation allowed people to travel farther afield; in many places, even the urban working class could escape to a seaside or mountain resort for the day.

Individual and Competitive Sports

Sports have always been important to human society, but with increased leisure time and the shifting cultural mores of the twentieth century, more and more people began engaging in individual physical activities and organized sports in addition to sports spectatorship. Participation depended on many factors, including where a person lived as well as income level, gender, and racial or ethnic group. In some places, specific racial and ethnic groups were excluded from sports until they won the right to participate through hard-fought battles. Similarly, women and girls were often discouraged or excluded from all but a few "genteel" sports; they, too, struggled to earn the right to play a wide range of sports.[2]

At the local level, many sports were simply played in the street, on abandoned urban properties, or in the fields. Beginning in the early decades of the century, the idea took hold that local governments should provide recreational facilities and programs. At the same time, many cities and towns began to establish public playgrounds to give children safe places to play, separated from the dangers of the streets.[3]

Amateur organized sports spread rapidly. Some reflected the influence of colonial powers, particularly cricket and rugby, which were played throughout the British Empire from self-governing dominions to subjugated colonies. With independence, cricket retained a following in many former colonies, including India, Pakistan, Sri Lanka, the West Indies, and South Africa. These and other sports such as soccer, baseball, basketball, ice hockey, and tennis were increasingly popular globally and played by children and adults alike in backyards and parks, through local leagues, at schools, and at the college and university levels.[4]

The twentieth century also witnessed the explosive growth of professional sports and with it mass spectatorship, whether audiences attended in person, listened over radio airwaves, or, after midcentury, watched sports through the burgeoning medium of television. Competitions took place in a wide array of structures and facilities, many of them notable works of architecture. Some have gained world recognition through television: Wimbledon (in London, England) for tennis, Pebble Beach (Pebble Beach, California) for golf, and Monaco for its Grand Prix Formula 1 auto racing. As crowds of spectators grew in size, older stadiums and facilities were frequently expanded and renovated, or demolished and rebuilt altogether, in order to increase their carrying capacity, facilitate broadcasting, and in some cases provide VIP areas and luxury suites. Over the course of the century, sports evolved into a multi-billion-dollar international industry: the "globalization of sports has been characterized by the creation of national and international sports organizations, the standardization and worldwide acceptance of the rules and regulations for individual and team sports, and the development of regularly scheduled international competitions."[5]

The modern Olympic Games are the pinnacle of international sports. First held in Athens in 1896, the Olympics have grown in size and scope, bringing the best athletes from around the world together in a single competition. As the Olympic movement gained in popularity across the century, host cities needed to construct progressively more elaborate facilities. These extended well beyond standard sporting facilities to encompass all manner of infrastructural improvements and tourist accommodations, both to manage the operation of the events and to present the locale in the best possible light to a huge international audience.[6] Once the Games are over, these facilities are usually adapted to new public uses. While the Olympic movement celebrates sporting prowess, some of its buildings also have political and social overtones, for instance the Olympic Stadium in Berlin, Germany (1936 Games), used by Hitler as a propaganda vehicle, and Yoyogi National Gymnasium in Tokyo (1964 Games), which symbolized Japan's emergence from the aftermath of WWII. The 1964 Tokyo Olympics were the first to be broadcast worldwide.

Visual and Audio Entertainment

Though moving pictures were beginning to emerge at the opening of the twentieth century, the only way people could see moving images prior to that was by visiting physical cycloramas, which portrayed grand events in large panoramic paintings. Live performances, such as opera, concerts, theater, and vaudeville, also required viewers to travel to public venues. Over the course of the century, options for home-based audio and visual entertainment, including radio and television, increased.

With the advent of the public cinema in the 1910s and 1920s, former live theaters were repurposed or new buildings were erected as places for showing the new black-and-white silent films. In the 1920s, especially after the arrival of "talkies" in 1927, larger, more opulent movie palaces began appearing in towns and cities around the world. During the interwar years, people got their news via newsreels, sometimes in purpose-built news cinemas. In the 1950s and 1960s, as color film became more popular, many new cinematic enterprises flourished, from Cinecittà in Italy to Bollywood in India. Film production arose in other postcolonial contexts such as Morocco and Algeria. During this period, both Japanese cinema and France's New Wave films also became world famous. The production and marketing of movies for primarily local audiences increasingly became a global phenomenon.

Viewers also enjoyed watching films outdoors. In the 1910s, open-air cinemas were introduced in places like Germany and Australia. Drive-in theaters, invented in the 1930s, gained in popularity in the years following WWII, especially in the US, where more than five thousand drive-ins were in operation by 1958. They appeared in other countries as well, especially those with expanding suburbs and rising car ownership. But these outdoor cinemas were unable to survive the challenges posed by the advent of television and rising suburban land values. By the end of the century, fewer than five hundred remained in the US, with only a smattering in other countries.[7]

After WWII, a fundamental shift occurred in consumer consumption of visual media, brought on by the rapid dissemination of television, a technology originating in the early twentieth century and one that became increasingly popular in the US, Europe, and other regions during the 1950s.[8] The advent of television led to a retreat from cinema-going. By the 1960s, many middle-class families in industrialized societies no longer regularly patronized movie theaters. As a result, thousands of cinemas around the world were either demolished or adapted for other uses. Cinema chains fought back by building large multiscreen complexes, but the days of glamorous movie palaces that accommodated huge numbers of people were gone. Of those that survived, some are now heritage listed. Today, smaller twentieth-century theaters and cinemas survive around the world, many of which still screen films.

Terrestrial television broadcasts brought moving visual imagery into the home (for those who could afford a television set), and analog transmissions proliferated until television itself suffered setbacks, first from the onset of video cassettes (VHS, or video home system, ca. 1976), followed by DVDs (digital versatile discs, ca. 1995).[9] Cable television (which mainly relied on fiber-optic technology) became popular in the US in the late 1970s, coinciding with the explosive growth of the internet and the World Wide Web, which progressively became a global communication phenomenon in the last quarter of the century.[10] By 1997, in twenty countries there were five hundred or more TVs per one thousand people; however, seventy-seven nations had fewer than one hundred TVs per thousand, and twenty-four had fewer than ten per thousand.[11] Such an item of technology and entertainment, regarded as standard in many parts of the world, hardly existed throughout much of Africa, where the first terrestrial television broadcast took place in 1959.[12]

The visual medium of photography, first used in the nineteenth century, was popularized after 1900, the year Eastman Kodak introduced the inexpensive, portable, and easy-to-use Brownie camera; ten million were sold in the first five years.[13] Photography rapidly became a popular leisure activity, allowing individuals to personally record whatever they wanted, including family life, travel, special events, and other activities. Technical advancements made photography ever more accessible to people around the world, influencing how people saw and understood the places in which they lived, played, worked, and traveled. In capturing their lives on film, both amateurs and professionals created a record of the twentieth-century world around them, a tool that can help future generations understand the physical environment of the past.

With respect to audio media, the most significant global technology was associated with radio, or wireless telegraphy, which was invented in the nineteenth century but became widespread in the 1920s, as amplitude modulation (AM) radio stations began transmitting live audio broadcasts directly to a receiving device.[14] Radios—the first models being quite large—were treated like furniture, usually placed in a living room so that entire families could gather round. As radios grew increasingly smaller,

especially from the 1950s, they were placed in any room; portable, battery-operated transistor radios even allowed outdoor use. Radio brought entertainment and news services into the home, exposing listeners to new types of music and forms of storytelling.

Syndicated radio programming was distributed on 78 rpm discs beginning in 1928; vinyl 33⅓ discs were introduced in the 1930s. These were the prototypes of long-playing records (ca. 1949), which stored music that could be repeatedly played on a specialized piece of hardware, the record player. Once available only to the well-to-do, record players became more affordable after 1955, when the transistor phonograph was released.[15] Records facilitated the spread and popularization of new forms of music and new musical artists and spawned a wave of performers with wide appeal who could command vast audiences around the world.

Live concerts were traditionally staged in purpose-built theaters, music halls, and nightclubs. Many of the rock-and-roll and pop bands that flourished in the 1960s and 1970s, however, attracted such large numbers that concerts often would be staged at racetracks or sports arenas because purpose-built venues could not accommodate the crowds of fans. Liberalized laws on serving alcohol in many societies allowed popular entertainment venues to add bars and sometimes food to their musical offerings.

Amusement Parks, Showgrounds, Expositions, and Theme Parks

Ocean piers and amusement parks have long provided entertainment to the masses. Some were vast, purpose-built complexes, while others were entirely portable and traveled from place to place. Many modern amusement parks evolved from earlier leisure destinations such as seaside resorts. Perhaps the most iconic was Luna Park, which opened on New York's Coney Island in 1903 and inspired many imitators around the world.

In the rural areas of many countries, agricultural fairs continued through the twentieth century, often in newly constructed or expanded permanent showgrounds, and increasingly incorporating a range of competitions and entertainments to attract throngs of visitors.

While many agricultural shows had their own permanent sites, world's fairs or expositions were usually purpose built for a specific event. These were generally conceived as temporary places and few have survived intact, but many produced one or more permanent structures that have been adapted for new uses. These events also served as catalysts for host cities to develop new infrastructure and tourist facilities. World's fairs and expositions were introduced in the second half of the nineteenth century and grew in size and scope during the twentieth. Since 1931, official World Expos or World's Fairs have been organized under the auspices of the Bureau International des Expositions (BIE). Some celebrated a historic achievement, such as the opening of the Panama Canal (the Panama-Pacific International Exposition, San Francisco, California, 1915), or were organized around themes of industry, art, and sport (e.g., the International Exhibition of Barcelona, Spain, 1929).[16] Still others, including the Exposition Coloniale Internationale of 1931 in Paris, France (which drew more than thirty-three million paying

customers over six months), reflected how European colonial powers viewed their achievements in other parts of the world.[17] In 1970, Osaka, Japan, became the first city outside Europe, Australia, or North America to host a World Expo. With the hopeful theme "Progress and Harmony for Mankind," it attracted more than sixty-four million visitors.[18]

The worlds of television, movies, and automobile-based attractions came together in the first Disneyland theme park, dreamed up by American entrepreneur and animation pioneer Walt Disney and realized in Anaheim, California, a small agricultural town not far from Los Angeles. Opened with great fanfare in 1955, Disneyland—an emblematic development in the latter half of the twentieth century—has become part of the immense Disney franchise, with adaptations of the park launched in Orlando, Florida (opened 1971), Tokyo, Japan (1983), and Paris, France (1992); additional parks debuted in Hong Kong and Shanghai, China, in the early twenty-first century. Hundreds of similar theme parks—movie worlds, water worlds, and so forth—are now found around the globe. Those that rely on visitors arriving by car are surrounded by expansive parking lots. Theme parks are designed so their rides and attractions can be replaced as fashions and technologies change, which makes heritage preservation a challenge.

Casinos and Racetracks

Casinos, considered a gambler's equivalent of an amusement park, were illegal in many countries until well after WWII. Nevertheless, some cities developed thriving government-regulated, gambling-centered economies. Beginning midcentury, the elaborately themed casinos of Las Vegas, Nevada, incorporated hotels, shops, theaters, and other leisure attractions that continued to draw vast numbers of visitors seeking to do more than just gamble.[19] Ever-larger casinos started to dominate the landscape in the Portuguese colony of Macau from the late 1960s, attracting gamblers from around the world. By 1999, it became evident that Macau, whose sovereignty had just reverted to China, would become the casino capital of the world, not only because more and more mainland Chinese citizens were now allowed to visit but also because gambling entrepreneurs from Las Vegas would soon be permitted to invest and build their own casinos there.[20]

In the 1970s, Native American tribes in the US began running gaming operations on tribally owned land as a means of raising revenue; these have been regulated under federal law since 1988. The result has been a proliferation of casinos across the country. By 2006, 40 percent of federally recognized tribes were engaged in some form of gaming, ranging from small bingo halls to elaborate hotel-casinos.[21] First Nations casino operations emerged in Canada from the mid-1990s.[22]

Prior to the boom in legal casinos, horse, dog, and car racing were popular pastimes for bettors, punters, and gamblers. Racetracks were built to hold large numbers of bettors and spectators. Motor sports were a distinctly twentieth-century phenomenon. Large tracks for auto and motorcycle racing were substantial installations in the landscape, with many tracks, grandstands, eating establishments, and some betting facilities remaining permanent. By the end of the century, the physicality of some forms of gambling was on the wane as internet betting became more prevalent.

The Rise of Independent Travel, Mass Tourism, and Tourism Infrastructure

Across the twentieth century, greater numbers of the working and middle class from more industrialized regions engaged in tourist activities, using their newly acquired vacation time to travel for pleasure and education. Earlier, most leisure travel took place by rail or passenger ship. With the advent of the automobile and the expansion of airplane travel after WWII, increasing numbers of people could traverse longer distances. The invention of the jet engine in the 1960s greatly reduced flight times, putting long-distance and transoceanic travel within reach for even more people. Competition among airlines gradually made flying more affordable.

While many traveled independently, mass tourism—"pre-scheduled tours for groups of people who travel together with similar purposes (recreation, sightseeing, etc.) usually under the organization of tourism professionals"[23]—gained in appeal early in the century. The biggest boom in tourist numbers occurred after WWII, however, when hotels, casinos, and tourist attractions proliferated, the marketing of package tours intensified, and changes in costs and logistics made travel more accessible.

At the opening of the century, Europe was already well established as an international travel destination. In the ensuing decades, its cities and well-known tourist sites became increasingly popular among those engaged in independent and mass tourism. In order to compete, destinations farther afield and less familiar had to market themselves aggressively. New Zealand, for instance, created the world's first government tourism ministry in 1901, using government funds to build substantial hotels in an attempt to offer accommodations on par with those in Europe, Canada, and the US.[24] Post-WWII, a growing number of governments recognized the economic potential and supported the development of tourism infrastructure. A number of airlines were nationalized. Socialist and communist countries, in particular the USSR and China, created bureaucracies to administer and monitor tourist travel.

Whether for purposes of business, leisure, or migration, travel necessitated a range of service facilities. Immigration and border control facilities were needed at points of entry, namely ports, airports, and road-based checkpoints at national boundaries. In the last decades of the century, some supranational groupings, most notably the European Union, allowed visa-less travel within their borders, while other nations continued to monitor visitors closely. A few countries, notably North Korea, did not allow tourists at all. In other nations, such as the USSR beginning in 1929 and China in the 1960s and 1970s, travelers were accepted only if accompanied by official guides.

Well-established tourist cities offered a wide array of restaurants, hotels, guesthouses, and youth hostels, from budget to luxurious. Many places built conference and convention facilities to expand their visitor base. Across time, technologies evolved along with visitor expectations and demands, and older lodgings and facilities were modernized and renovated to keep pace: en suite bathrooms were added, elevators installed, and systems updated, for instance. Tourist sites themselves provided a variety of amenities, including cafes, shops, and accommodations, as well as additional attractions like public artworks and exhibitions. Many national parks developed unique visitor facilities and accommodations.

Many places that have become tourist attractions were originally designed to serve entirely different purposes; religious structures are one example. Others may have been built with a utilitarian purpose

but were also conceived as tourist attractions. Millions of tourists have walked or cycled across the great steel bridges of the 1930s, including the Sydney Harbour Bridge in Australia (completed 1932) and, in California, San Francisco's Golden Gate Bridge (1937). Though their primary purpose was transportation, both supply spectacular views of their respective cities and waterfront settings.

Among the major twentieth-century attractions were observation decks, their popularity fueled by the never-ending competition to erect the world's tallest building. At 1,482.51 feet high, the Petronas Twin Towers in Kuala Lumpur, Malaysia (completed 1998), were the tallest buildings of the century. The CN Tower in Toronto, Ontario, Canada (1976), at 1,815.4 feet, was the tallest freestanding structure built in the twentieth century and today attracts more than one million visitors per year.[25]

Though intrepid motorists began traveling by auto early in the century, it was not until decent paved-road networks and traveler services were established that ordinary people began taking to the road in numbers. This happened as early as the 1920s in some places and much later in others. Service stations, cafes, drive-in and drive-through restaurants, lodgings, and rest stops with sanitary facilities popped up along tourist routes and highways around the world. Many of these businesses employed eye-catching signage, billboards, or unusual building designs to grab the attention of passing motorists. Low-rise motels (*motels* being a portmanteau of *motor* and *hotels*) offered convenient parking—often right in front of the rooms—and units with self-contained bathrooms. They arrived first in the US in the 1920s and spread to other car-oriented societies in the 1950s and 1960s.[26] Roadside attractions sprang up, oftentimes taking the form of giant things or natural wonders and serving as whimsical features across the landscape. Intended specifically to appeal to tourists, they offered diversions on drives across the US, Canada, Australia, and other countries.

With the massive growth in tourism, by the late century popular sites were under threat of being overrun by the very people they were attracting. Though many twentieth-century places enjoyed great popularity, the majority of the world's most visited sites were creations of earlier centuries.[27] Tourism, as an industry, was welcomed by most national governments. It brought investment, provided employment, infused money into the economy, served as a source of tax revenue, monetized natural and human-made places, and was often a source of local and national pride. As sites became increasingly overwhelmed, however, this undermined the visitor experience and presented challenges for conservation and the sustained existence of the place. In response, some sites were more successful than others in striking a balance between visitor access and conservation.

Photo Gallery

The table below lists a selection of subthemes and types of places related to theme 8 and is excerpted from "Twentieth-Century Themes, Subthemes, and the Places that Exemplify Them" (see pp. 10–15). It is followed by a gallery of photos showing a diverse range of buildings, sites, structures, and landscapes from around the world that exemplify the issues and subthemes discussed. The text accompanying each photo explains how that place represents the theme of the preceding essay. Some of these places may already be listed as heritage places (from local inventories to the World Heritage List) while others are not, though they *may* be identified as significant in the future. Some are specifically mentioned in the text; many are not. All are included here as exemplars to prompt broad exploration of potential heritage places.

Theme 8 POPULAR CULTURE AND TOURISM

Subthemes	Types of Places
• Growing access to leisure • Increased participation in individual and competitive sports • Growth of mass sports spectatorship and international sports competition • Production, distribution, and screening of films • Growth in home-based entertainment through TV and radio • Emergence of popular photography • Emergence of amusement and theme parks • Expansion of international expositions • Legalization of gambling • Growth and promotion of tourism • Development of visitor service facilities • Birth of automobile-based travel	• Sporting, recreation, and leisure facilities • Olympic stadiums and sites • Cinemas and theaters • Television and film studios • Television and radio broadcasting facilities • Amusement parks and showgrounds • World's Fair and World Exposition sites • Casinos • Racetracks • Airports, bus depots, and train stations • Lodgings and accommodations • Conference and convention facilities • Restaurants and cafes • Viewing towers and observation decks • Roadside attractions and rest stops

Figure 8.1. Sidi Harazem thermal bath complex, 1958, Sidi Harazem, Morocco. Located outside the city of Fez, this leisure complex comprises pools, baths, walkways, bungalows, terraced gardens, and open-air pavilions. Financed by the CDG Moroccan pension fund just two years after independence, it was designed by Jean-François Zevaco, a local architect who had studied in Paris, where he was influenced by the principles of Brutalist architecture. Locals were attracted not only to its refreshing water features and unusual concrete forms but also to its location adjacent to the Sufi shrine venerating the saint for which the complex is named.

Photo: 2019, Antoine Wilmering, © J. Paul Getty Trust.

Figure 8.2. Yoyogi National Gymnasium, 1961–64, Tokyo, Japan. This structural marvel—a hybrid form derived from both contemporary engineering and an abstracted Japanese pagoda—was designed by Japanese architect Kenzo Tange for the swimming and diving competitions of the 1964 Olympics, held in Tokyo. It can accommodate ten thousand spectators and is used for entertainment and sporting events today. Tange supported large steel cables between two towers, then suspended from them a series of cables that support sweeping, concrete roof planes. When completed, the gymnasium boasted the largest suspended roof span in the world.

Photo: 2020, Arne Müseler / arne-mueseler.com / CC-BY-SA-3.0 /https://creativecommons.org/licenses/by-sa/3.0/de/deed.de

Figure 8.3. Cinema Impero (Empire Cinema), 1937, Asmara, Eritrea. This theater derives its name from Mussolini's declaration of the creation of the Italian Empire in Africa after the fascist Italian dictator and his troops invaded and captured Ethiopia in 1936. Designed by Italian architect Mario Messina, the Cinema Impero was the largest theater in Asmara and reflects the importance of cinema as a source of public leisure in this colonial urban outpost. By the end of the century, the largely intact building, with its art deco flourishes—circular lights and vertical lettering grace its front facade—had become a prominent tourist site.

Photo: 2015, Sailko, courtesy Wikimedia Commons, CC BY-SA 3.0.

Figure 8.4. Cinecittà Studios, 1937, Rome, Italy. Established by Mussolini in an attempt to stimulate the then depressed Italian film industry, Cinecittà was bombed (but not destroyed) near the end of WWII. Recovering successfully in the 1950s, it earned the nickname "Hollywood on the Tiber" and became Europe's largest studio complex. Although more than three thousand movies were filmed there, the studios suffered financially in the 1990s; to avoid bankruptcy, the Italian government privatized it in 1997. Cinecittà came to symbolize the rising postwar interest in European cinema, competing with Hollywood in the US and Bollywood in India as a major cinematic enterprise.

Photo: 2014, Emanuela Meme Giudici, courtesy Wikimedia Commons, CC BY-3.0.

Figure 8.5. Luna Park, 1912, Melbourne, Australia. Luna Park was built by a group of American theater and carnival entrepreneurs on the site of a failed amusement park called Dreamland in a bayside Melbourne suburb. It was transformed into a version of New York's famous Luna Park (opened 1903), located on Coney Island in the city's borough of Brooklyn. Melbourne's Luna Park, with its iconic open-mouth entrance, roller coasters, and other amusements, quickly became a popular attraction. Its commercial success led to the construction of three others in Australia, at Adelaide (built 1930 and relocated to Sydney in 1935), Perth (1939), and Brisbane (1944). The Melbourne and Sydney parks survive; both are heritage listed.

Photo: 2007, Donaldytong, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 8.6. Biosphere, 1967, Montreal, Quebec, Canada. Named for the global ecological system that integrates all living beings, Biosphere was designed by US engineer R. Buckminster Fuller as the United States Pavilion for the 1967 World Exhibition (Expo '67). Fuller's large geodesic dome was originally glazed with transparent acrylic panels (destroyed by fire in 1976) enclosing a steel frame, and incorporated a complicated sun-shading system that sought to simulate natural and human-made ecologies. Purchased by the government of Canada in 1990, Biosphere became a water museum in 1995 and an interactive environment museum in 2007.

Photo: 2007, Philipp Hienstorfer, courtesy Wikimedia Commons, CC BY-SA-4.0.

Figure 8.7. Disneyland Park, 1955, Anaheim, California, USA. This world-renowned family entertainment complex was founded by Walt Disney, the American entrepreneur who, in conceptualizing Disneyland, capitalized on both nostalgic sentiment for an idealized American past and the popularity of characters from his production company's animated films. These characters came to life (with the assistance of actors) within the colorful settings of the park, backed by a wide assortment of thematic rides and attractions, including Sleeping Beauty's Castle (pictured). This type of theme-based park proved to be hugely successful, inspiring Disney and his corporate successors to create other Disney-branded ventures. It also inspired the establishment of amusement parks based on other popular culture icons, such as Asterix (comic books) and Lego (toys).

Photo: 2010, Alfred A. Si, courtesy Wikimedia Commons, public domain.

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Figure 8.8. Sepang International Circuit, 1999, Sepang, Malaysia. This massive motorsport racetrack is located forty-five kilometers south of Malaysia's capital, Kuala Lumpur. Erected at century's end and designed by German engineer and race car driver Hermann Tilke, the circuit celebrated Malaysia as a Formula 1 Grand Prix venue and was completed shortly after Cesar Pelli's Petronas Twin Towers became the world's tallest structures (see fig. 1.9). The circuit benefited from the country's new oil wealth and its rising middle class—many of whom patronized racing events—in the last two decades of the century.

Photo: 2006, Postmortem at Russian Wikipedia, courtesy Wikimedia Commons, public domain.

Figure 8.9. Pampulha Casino (now Pampulha Art Museum), 1940, Pampulha, Belo Horizonte, Brazil. This structure, designed by Brazilian architect Oscar Niemeyer as a center for leisure and culture, is part of an ensemble of four buildings (casino, ballroom, golf and yacht club, and church). These are set within landscaped grounds planned by Roberto Burle Marx, also Brazilian born, and located along an artificial lake in a new garden-city neighborhood of the regional capital. Integrating architecture, landscape design, sculpture, and painting, the complex reflects the adaptation of the principles of modern architecture to the Brazilian climate and natural surroundings. It was inscribed on the World Heritage List in 2016.

Photo: 2017, ©Sheridan Burke.

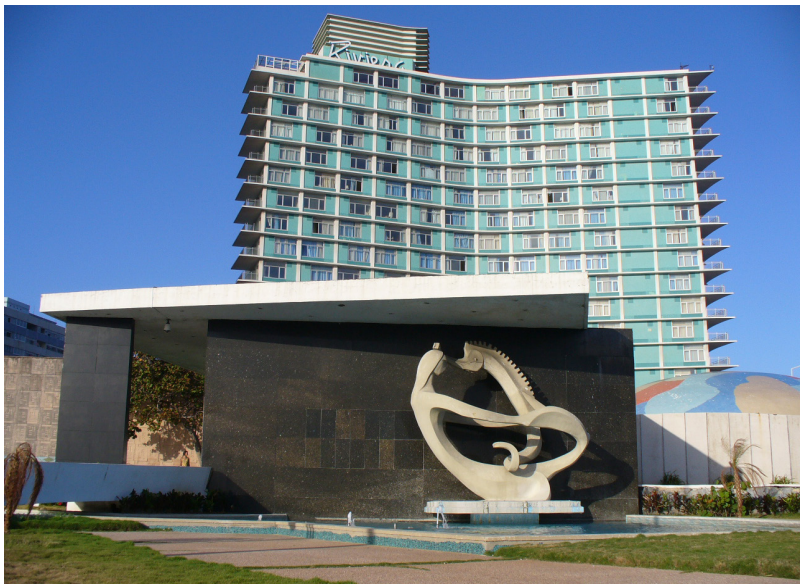

Figure 8.10. Havana Riviera (now Hotel Habana Riviera), 1957, Havana, Cuba. When the Riviera opened in December 1957, Havana was an international hotspot for gambling and nightlife. At the time, the Riviera was the largest casino-hotel resort outside of Las Vegas, Nevada. Conceived by Miami, Florida–based architect Igor B. Polevitzky, with integrated artworks by sculptor Florencio Gelabert and muralist Rolando López Dirube, both Cuban born, it was a triumph of modern tropical design and featured such comforts as central air conditioning, rare for the time. The hotel continued to operate even after the revolutionary Cuban government nationalized hotel-casinos and outlawed gambling. Today, the luxurious complex retains much of its original decor and furnishings. It was declared a national monument in 2012.

Photo: 2007, Leandro Neumann Ciuffo, courtesy Wikimedia Commons, CC BY 2.0.

Figure 8.11. Jumbo Kingdom Floating Restaurant, 1976, Hong Kong, China. Attracting more than thirty million patrons since it opened, Jumbo Kingdom is a popular tourist attraction in Aberdeen, a harbor on the south side of Hong Kong Island. The multistory floating restaurant, accessed by a free shuttle boat, was envisioned in the style of an ancient Chinese palace. It epitomizes the merging of local or regional traditions with commercial entrepreneurship and tourism to yield unusual structures and sites in the second half of the twentieth century.

Photo: 2012, Michal Osmenda, courtesy Wikimedia Commons, CC BY-2.0.

Figure 8.12. Kenyatta International Conference Centre (now Kenyatta International Convention Centre, or KICC), 1973, Nairobi, Kenya. Commissioned by and named for Jomo Kenyatta, first president of independent Kenya, the KICC was the first building constructed by the young government. It symbolized the country's desire to establish itself as a destination for business travel. In September 1973, two weeks after its dedication, the KICC hosted its first major event: the annual IMF/World Bank meeting, which brought nearly three thousand delegates from 126 countries. Designed by architects Karl Henrik Nøstvik (Norwegian born) and David Mutiso (Kenyan born), the complex references the local vernacular color palette, and its tower and conical-shaped amphitheater borrow from traditional architectural forms and motifs. It remains one of the leading conference centers in Africa.

Photo: 2009, Jorge Láscar, courtesy Wikimedia Commons, CC By 2.0.

Figure 8.13. Chateau Lake Louise, 1890s–1980s, Banff National Park, Alberta, Canada. One of a series of tourist hotels constructed by the Canadian Pacific Railway along its transcontinental line, Chateau Lake Louise provided lodgings for travelers but, with its spectacular natural setting, was also a destination in itself. Such grand railway hotels spurred the development of national park tourism in Canada, the US, and other countries. The Chateau was expanded and modernized a number of times over the years (the oldest portion of the current hotel dates to 1912) to accommodate growing numbers of visitors, especially after the advent of automobile travel.

Photo: 2008, Chris Phan, Courtesy Wikimedia Commons, CC BY-2.0.

Figure 8.14. Blue Swallow Motel, 1940, Tucumcari, New Mexico, USA. Built to accommodate motorists in a popular town on historic Route 66 (stretching from Chicago, Illinois, to Los Angeles, California), this twelve-unit motel retains many elements that evoke a time, from approximately 1940 to 1965, before interstate highways began crossing the landscape. Motel owners used distinctive signage and neon lighting to tout such modern amenities as "100% refrigerated air" to passing drivers. Patrons could park their cars right outside their rooms, eat in the nearby restaurant, and rest before continuing on their journeys.

Photo: 2013, KatRob, courtesy Wikimedia Commons, CC BY-SA 3.0.

Figure 8.15. Big Merino, 1985, Goulburn, New South Wales, Australia. This fifteen-meter- (fifty-foot-) tall sculpture, in the shape of a merino ram, was built as a celebration of the local fine wool industry. Positioned along a major interurban highway, it was designed to draw tourists to its gift shop and adjacent service station and cafe. Visitors can peer out of the giant ram's eyes for a view of the surrounding area. When a new highway bypass hindered access, the city moved the roadside attraction closer to the new highway exit, where it continues to attract travelers today.

Photo: 2019, Gail Ostergren, GCI.

NOTES

1. "The Origin of Shinjuku Imperial Garden," Ministry of the Environment Government of Japan, accessed March 3, 2020, https://www.env.go.jp/garden/shinjukugyoen/english/1_intro/history.html.
2. *Encyclopedia Britannica*, s.v. "Sports: Globalization and Sports Processes," by Joseph Anthony Maguire et al., last modified February 14, 2020, https://www.britannica.com/sports/sports/Sociology-of-sports#ref253566.
3. *Encyclopedia Britannica*, s.v. "Playground," by Fosco Maraini, last modified May 27, 2019, https://www.britannica.com/topic/playground; and Harm Stevens, "'The Tumbling Child Belongs in the City Scene, Like Herring Carts': Playgrounds and Equipment by Aldo Van Eyck," *Rijksmuseum Bulletin* 61, no. 4 (2013): 364–91.
4. For a ranking of popular sports as of 2018, see Benjamin Elisha Sawe, "The Most Popular Sports in the World," WorldAtlas, last modified April 5, 2018, https://www.worldatlas.com/articles/what-are-the-most-popular-sports-in-the-world.html.
5. *Encyclopedia Britannica*, "Sports: Globalization and Sports Processes."
6. Brian Chalkley and Stephen Essex, "Urban Development through Hosting International Events: A History of the Olympic Games," *Planning Perspectives* 14, no. 4 (1999): 369.
7. Don Sanders and Susan Sanders, *The American Drive-in Movie Theater* (Osceola, WI: Motorbooks International, 1997), 136, 101–5.
8. R. W. Burns, *Television: An International History of the Formative Years* (London: Institution of Electrical Engineers, 1998).
9. "Milestones: Development of VHS, a World Standard for Home Video Recording, 1976," Engineering and Technology History Wiki, last modified December 31, 2015, https://ethw.org/Milestones:Development_of_VHS,_a_World_Standard_for_Home_Video_Recording,_1976; and Jim Taylor, *DVD Demystified: The Guidebook for DVD-Video and DVD-ROM* (New York: McGraw-Hill, 1998), 405.
10. Barry M. Leiner et al., *Brief History of the Internet* (Reston, VA: Internet Society, 1997), accessed June 18, 2019, https://www.internetsociety.org/internet/history-internet/brief-history-internet/.
11. "Media > Television receivers > Per capita: Countries Compared," NationMaster, last modified May 5, 2014, https://www.nationmaster.com/country-info/stats/Media/Television-receivers/Per-capita#1997.
12. Nnamdi I. Nwulu et al., "Abstract: Television Broadcasting in Africa: Pioneering Milestones," in *Proceedings of the 2010 Second Region 8 IEEE Conference on the History of Communications*, Madrid, Spain, November 3–5 (Piscataway, NJ: Institute of Electrical and Electronics Engineers, 2010), https://ieeexplore.ieee.org/document/5735315/authors#authors.
13. Eric Schewe, "How the Brownie Camera Made Everyone a Photographer," *JSTOR Daily* (blog), December 26, 2018, https://daily.jstor.org/how-the-brownie-camera-made-everyone-a-photographer/.
14. For a history of radio technology, see Brian Regal, *Radio: The Life Story of a Technology* (Westport, CT: Greenwood Press, 2005).
15. "Phonograph Operated on Transistors to Be Sold by Philco Corp," *Wall Street Journal*, June 28, 1955, p. 8.
16. "Expo 1915 San Francisco," Bureau International des Expositions, accessed March 4, 2020, https://www.bie-paris.org/site/en/1915-san-francisco; and "Expo 1929 Barcelona," Bureau International des Expositions, accessed March 4, 2020, https://www.bie-paris.org/site/en/1929-barcelona.
17. Arthur Chandler, "Empire of the Republic: The Exposition Coloniale Internationale de Paris, 1931," expanded and revised from *World's Fair* 8, no. 4 (1988), and *Contemporary French Civilization* (Winter/Spring 1990), ArthurChandler.com, accessed March 4, 2020, http://www.arthurchandler.com/paris-1931-exposition/.
18. "Expo 1970 Osaka." Bureau International des Expositions, accessed January 28, 2020, https://www.bie-paris.org/site/en/1970-osaka.
19. Paul Franke, *Of the Rat Pack, Ashtrays, Cocktail Napkins, and Grateful Losers: The Making of the Las Vegas Experience as a Historical Process in the 20th Century*. UNLV Center for Gaming Research Occasional Paper Series no. 39 (Las Vegas: Center for Gaming Research, UNLV University Libraries, 2017), 2–3, https://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=1045&context=occ_papers.
20. "Macau Gaming Summary: Macau Gaming Timeline," UNLV Center for Gaming Research, last modified January 25, 2019, https://gaming.unlv.edu/abstract/macau.html.

21. James I. Schaap, "The Growth of the Native American Gaming Industry: What Has the Past Provided, and What Does the Future Hold?," *American Indian Quarterly* 34, no. 3 (Summer 2010): 369; and "History," National Indian Gaming Commission, accessed January 28, 2020, https://www.nigc.gov/commission/history.
22. Yale Belanger, "First Nations Gaming in Canada: Gauging Past and Ongoing Development," *Journal of Law and Social Policy* 30 (2018): 175.
23. Erkan Sezgin and Medet Yolal, "Golden Age of Mass Tourism: Its History and Development," in *Visions for Global Tourism Industry: Creating and Sustaining Competitive Strategies*, ed. Murat Kasimoglu (London: IntechOpen, 2012), 73, https://www.intechopen.com/books/visions-for-global-tourism-industry-creating-and-sustaining-competitive-strategies.
24. "New Zealand Tourism: Facts and Figures," Tourism New Zealand, last modified October 2, 2014, https://media.newzealand.com/en/story-ideas/new-zealand-tourism-facts-and-figures/; and Margaret McClure, *The Wonder Country: Making New Zealand Tourism* (Auckland: Auckland University Press, 2004).
25. "100 Tallest Completed Buildings in the World by Height to Architectural Top," The Skyscraper Center, accessed March 4, 2020, https://www.skyscrapercenter.com/buildings; and "Astounding: Celebrating the History of Canada's Architectural, Engineering and Construction Wonder," CN Tower, accessed March 4, 2020, https://www.cntower.ca/en-ca/about-us/history/astounding.html.
26. Rudi Volti, "Automobiles and Leisure," in *Encyclopedia of Recreation and Leisure in America*, vol. 2 (Farmington Hills, MI: Charles Scribner's Sons, 2004), 50–51. On motels in Australia, see Jim Davidson and Peter Spearritt, "Mobility and Its Consequences," in *Holiday Business: Tourism in Australia since 1870* (Melbourne: Melbourne University Press, 2000), 179–86.
27. "The World's Most-Visited Tourist Attractions," *Travel and Leisure*, November 10, 2014, https://www.travelandleisure.com/slideshows/worlds-most-visited-tourist-attractions.

Theme 9

Religious, Educational, and Cultural Institutions

Between 1900 and 2000, religious, educational, and cultural institutions evolved. Though the world's population grew exponentially during this period, the proportions of adherents to most of the major religious groupings remained relatively stable. Nonetheless, there was a decline in formal religious practice in many places, owing partly to a trend toward secularism in some societies and restriction of religious practice by governments in others. In designing new sanctuaries, many churches embraced modernism, while others continued to build in traditional styles. Some twentieth-century theological developments resulted in the reconfiguration of worship spaces. These shifts and others had important implications for the buildings and settings that were associated with religious practices.

The century witnessed a great expansion in public education through both formal and informal means. As governments widened the scope of education, significant innovations were made in elementary, secondary, technical, and university education, leading to increased literacy and a more skilled workforce that could adapt to the impacts of science and technology. These changes were also reflected in physical form by the growth in number and variety of schools and universities. Increased opportunities for informal learning, which supports and enhances people's intellectual and cultural lives, accompanied the creation and expansion of such cultural institutions as museums and libraries. As the century progressed, such institutions became increasingly accessible to people from all walks of life. In the newly independent nations that emerged in the wake of decolonialization, new educational and cultural institutions became essential to the process of defining a new national identity.

Religious Institutions and Practices

In 1910, slightly more than one-third of the world's people identified as Christian, approximately 12.5 percent Muslim, 12.5 percent Hindu, and 8 percent Buddhist; the approximate remaining third comprised almost a thousand religious and faith traditions, including Judaism and Sikhism. A very small percentage of people professed no religion.[1] Churches, temples, mosques, synagogues, and other religious structures had long been prominent across cities, towns, and villages. They frequently occu-

pied commanding sites and were often architecturally significant. Many were part of larger complexes that included schools and hospitals. At century's end, sites with religious or spiritual connections composed approximately one-fifth of all properties on the World Heritage List (WHL).[2] Yet, modest vernacular structures or tiny roadside shrines or chapels may be equally important in conveying the pivotal role that religious belief and places of worship play in the lives of communities.

Some religions have long sought to convert others through missionary activities, particularly Christian denominations. For example, centuries of Catholic missionary activity in association with European colonization in South America, Africa, Asia, and other places left behind a legacy of religious practice and language that endured after countries in these regions gained their independence in the nineteenth and twentieth centuries. Numerous religious buildings and sites in these places represent a shared heritage.

As the world's population more than tripled (from 1.65 billion in 1900 to 6.14 billion in 2000), the proportions of adherents to the major religious groupings remained relatively stable, the major exception being the Muslim population, which increased from 12.6 to 21.1 percent.[3] At century's end, Catholicism, the largest Christian denomination, still commanded regular attendance in some societies, especially in Mexico, the Philippines, and South America, while a variety of Christian religions flourished in parts of Africa and India. Some relatively young religions also saw a rapid increase in adherents globally—the Church of Jesus Christ of Latter-day Saints, for example, which actively proselytizes and emphasizes marriage and family. The uptick in population led to the construction of numerous houses of worship in places large and small throughout the world.

Beyond sheer population growth, many factors contributed to the construction of these new structures, including the movement of people from city centers to suburban districts and housing estates (for more on migration and suburbanization, see theme 1) and the war-related destruction of historic religious edifices. In many instances, new structures were built using modern methods and materials but were clad in historicist detail. A gradual shift away from historicism and toward modernism began in the 1920s and exploded in the post–World War II (WWII) era, as designers of religious buildings "pushed the envelope of aesthetics and building technology, and bridged modernism with religion by abstracting cultural and faith traditions."[4]

Theological developments such as an increased emphasis on congregational participation in worship led to the reorganization of interior spaces. This is especially true of the Catholic Church on the heels of changes brought about during the early twentieth-century liturgical movement that were ultimately approved by the Second Vatican Council in 1963.[5] In Asia and the Middle East, rising numbers of Muslims saw huge, often state-sponsored mosques constructed. In many places, young or growing denominations took over sanctuaries abandoned by other faiths or converted buildings—cinemas, storefronts, and warehouses among them—into places of worship.

Some European countries saw the emergence of a strong anticlerical movement. In France, an act in 1905 formally separated the Catholic Church from the French state, which simultaneously claimed ownership of most religious property.[6] The country's national and local governments subsequently found themselves responsible for the maintenance of thousands of churches, from Notre Dame in Paris to small village chapels.

From the mid-twentieth century, governments in Australia, New Zealand, Canada, and the US, among others, began to recognize and protect certain rights of Indigenous peoples. These protections encompassed, in varying degrees, language and cultural rights as well as land and property rights (for more on the postcolonial struggle for human rights, see theme 6). By the end of the century, in the face of demands for greater engagement with Indigenous peoples, more professionals and national governments had begun to recognize that many Indigenous sacred sites were not necessarily indicated by buildings but instead were places within the landscape that had deep traditional connections.

Despite the stability in numbers of adherents to major faiths, the proportion of people worldwide who practiced no religion or did not believe in a deity increased from less than 1 percent at the beginning of the century to nearly 13 percent by the end.[7] This can be attributed to the rise of communist regimes that restricted the practice of religion and to a trend toward secularism, particularly in Europe and North America. By 2000, many religious buildings, especially in the Western world, were no longer operational, either demolished or given over to other activities. Attendance at formal religious services had fallen precipitously, particularly among Christian churches in Europe and Shinto and Buddhist shrines in Japan. Some smaller Protestant religions united, consolidating their properties and selling or abandoning churches that could no longer sustain congregations. Functioning houses of worship and religious sites in many parts of the world, especially those significant for their historic or architectural values, attracted tourists as well as worshippers.

Mass Education and Literacy

For many centuries, the largest libraries belonged to religious organizations, and religious leaders were among the most literate of all professionals. Religious organizations had also been the major providers of education. However, owing to the rapid growth of government primary or elementary schools and secular universities in the Western world in the latter half of the nineteenth century, these institutions were no longer the dominant providers, though they continued to be in other parts of the globe.

At the turn of the twentieth century, new industries and improved industrial processes mandated a more highly skilled workforce. Improvements were made through basic primary and secondary education and through technical training in both agriculture and manufacturing. New methods and equipment were introduced in succession, leading to the need for continuing education and skills updating. Growing numbers of colleges and universities prepared skilled workers, professionals, and researchers. Democratic governments understood that an educated citizenry would be better able to participate in political processes, whereas in one-party authoritarian states the education system was also used as a form of ideological control. Generally speaking, boys were educated at higher rates than were girls, and girls' education to a large extent focused on domestic skills.[8]

The world began experiencing sharp increases in literacy related to the expansion of basic education. In 1900, only 21 percent of the world's population could read and write. By 1950, the literacy rate had grown to 56 percent and, by century's end, to approximately 82 percent.[9] Education, once the purview of the privileged, was declared a human right in Article 2 of the first protocol to the European Convention on Human Rights in 1952 and in Article 13 of the United Nations' International Covenant on Economic, Social and Cultural Rights in 1966.[10]

Europe and North America saw improvements in literacy during the nineteenth century. For Asia, Africa, and South America, the big increases came in the latter half of the following century. Numeracy skills—the ability to use basic math—progressed worldwide as well. Religious schools, many founded by Catholic or Protestant missionaries, could not keep up with educating a rapidly growing population. Increasingly, governments opened state-run elementary or primary schools as well as secondary schools, colleges, and universities. In many places, governments also provided preschool and kindergarten education, which fostered early childhood development.

Early in the twentieth century, purpose-built primary and secondary schools were largely utilitarian places, cloaked in traditional architectural styles and designed to maximize classroom space and provide adequate ventilation, heating, and natural light. Over the ensuing decades, new educational theories and methods led to innovations in school design. Educational innovators proposed new methods for teaching children that impacted the design of educational facilities. Among these pioneers are Maria Montessori in Italy and Rudolf Steiner in Germany, both of whom favored a child-centered approach; John Dewey in the US, a proponent of hands-on learning; and Rabindranath Tagore and Sri Aurobindo in India, who established ashrams as experimental schools.[11] An "open-air" school movement—building schools "in the woods" with ample ventilation to help prevent tuberculosis—began with the construction of the *Waldschule* in Charlottenburg, Germany, in 1904, and quickly spread not only throughout Europe but also to North America and Australia.[12] During the 1920s and 1930s, architects in Europe and North America planned school facilities that emphasized fresh air, natural light, circulation, and easy access to the outdoors. These include well-known structures by Eliel Saarinen and Alvar Aalto, both Finnish born, Richard Neutra of the US, and many others.[13]

After the mid-1900s, the massive expansion of government-funded primary and secondary schools worldwide spurred the growth in literacy rates. Due to the postwar baby boom, the number of children to be educated grew exponentially, requiring governments, religious institutions, and philanthropic foundations to fund educational infrastructure that would provide the facilities needed to improve the quality of the educational experience. The physical apparatus of schooling spread wherever there were children to be taught and varied from makeshift classrooms without electricity or running water to vast, well-equipped campuses.

In the wake of decolonization, newly independent nations invested heavily in education in the interest of national development, with many making schooling compulsory. While government-funded primary education was usually free of charge, in some developing countries it was limited. For example, beginning in the 1990s in Vietnam, families were frequently subjected to unofficial fees to send their children to school, limiting educational opportunities.[14]

Architects continued to innovate, maintaining an emphasis on fresh air, light, and outdoor access while making use of advances in prefabrication and building materials and moving toward standardization in school design.[15] In some places, schools were supplemented by other child-centered facilities such as public playgrounds, including hundreds designed by Dutch architect Aldo van Eyck—intended to stimulate creativity and imagination—that were built in Amsterdam, the Netherlands, between 1947 and 1978.[16] As the century progressed, pedagogical developments led to experimentation with open-plan schools and classrooms.

The need for skilled tradespeople led to the proliferation of technical and agricultural colleges, which first arose in the late nineteenth to early twentieth century. A university education, once the preserve only of the elite, democratized and became more accessible throughout the century. In 1900, approximately 1 percent of college-age people were enrolled in higher education institutes worldwide; by 2000, that number had risen to about 20 percent.[17] Post-WWII, the advent of educational benefits for war veterans and the availability of scholarships for economically disadvantaged students opened the doors to higher education for many. Postsecondary education flourished around the world, particularly in the latter decades of the century, with established institutions expanding their facilities and hundreds of new colleges and universities being created. In postrevolutionary Cuba, Fidel Castro and Che Guevara sponsored construction of the National Art Schools (1961–65).[18] While elite universities often restricted enrollments, new institutions in countries such as India, Bangladesh, and Turkey admitted students in the hundreds of thousands.[19] Anadolu University in Eskişehir, Turkey, founded in 1982 by amalgamating four existing higher education institutes, also became the national provider of distance education; in 1998, the World Bank recognized it as the world's largest university.[20]

Colleges and universities employed a diverse range of architectural styles and campus designs. Though many continued to build in traditional architectural styles, others reinterpreted the features and functions of earlier campuses in contemporary styles, deploying such features as colonnades and quadrangles to establish their scholarly ambience while respecting the historic campus context. Beginning in the 1950s, there was a boom in college and university construction, and both Brutalist and steel-and-glass designs became prevalent.

Expansion of Cultural Institutions: Museums and Libraries

Not only did the twentieth century see the growth of formal educational institutions worldwide, it also was accompanied by an enormous expansion of the informal, or parallel, educational system, which supports and enhances people's intellectual and cultural lives through such institutions as museums and libraries.[21]

Large art galleries, archives, and museums housing treasured collections have long been in existence. Some of the world's largest collections were established in the seventeenth, eighteenth, and nineteenth centuries, concentrating on painting and sculpture, archaeological artifacts, and natural history. Museums and galleries often housed stolen or looted items, especially those pilfered in wartime or purchased under dubious circumstances by wealthy collectors and dealers. Issues of cultural appropriation became a topic of regular debate over the course of the twentieth century, not least the controversy surrounding the Elgin Marbles (also called the Parthenon Marbles), removed from Athens, Greece, in the nineteenth century and held by the British Museum, London.

The century marked a radical departure from classical traditions in all aspects of culture—art, music, design, dance, and popular culture—often summed up by the much debated term *modernism*. New York's Museum of Modern Art, opened in 1929 with philanthropic support, moved to a purpose-built permanent home ten years later. Since then, scores of museums devoted to modern or contemporary

art have been established around the world, in cities as far flung as Stockholm, Sweden; San Francisco, California; Tokyo, Japan; Santiago, Chile; and San Juan, Puerto Rico.

National governments and larger cities often invested in art galleries and museums, while in Europe the fascination with the ancient world, made so apparent in the popularity of the British Museum, continued apace in the twentieth century with the opening of the new Pergamon Museum in Berlin, Germany, in 1910 (replacing a smaller museum building). Natural history and art museums, galleries, and libraries greatly expanded in size and number, sometimes implementing new architectural designs. Swiss-born French architect and theorist Le Corbusier, for one, conceived modernist museums in Ahmedabad and Chandigarh, India (1954 and 1969, respectively), and Tokyo, Japan (1959; inscribed WHL in 2016). By contrast, open-air or folk museums held their collections in historic or relocated buildings following European and North American models introduced from the late nineteenth century. The internationalization of museum practice was supported by the International Council of Museums, founded in 1946.

After WWII, many new museums were established as a way of demonstrating national confidence and pride, including the São Paulo Museum of Art, Brazil (opened 1947; new building inaugurated 1968); the National Museum of China, Beijing (1926; new building inaugurated 1959); and the National Museum of Anthropology, Mexico City, Mexico (evolved from a nineteenth-century museum; new building inaugurated 1964). In the US, the National Air and Space Museum in Washington, DC (1946; new building inaugurated 1976), was unusual for the era in that it did not ignore the achievements of its rival in the space race, the USSR.

As in previous centuries, wealthy philanthropists continued to fund notable new buildings to house their own private collections. The Solomon R. Guggenheim Museum, designed by American architect Frank Lloyd Wright, opened in New York in 1959. Tadao Ando of Japan was the architect for the Benesse House Museum (1992) on the "art island" of Naoshima in Japan's inland sea. The Guggenheim Museum Bilbao, Spain (1997)—designed by US (Canadian-born) architect Frank Gehry—was financed by the Basque administration and proved that a new, architecturally innovative cultural institution could spark the revitalization of a declining city and boost tourism. Its success served as a model for other cities, sometimes referred to as "the Bilbao effect." Large new museums have also been located in adapted heritage structures, including the Musée d'Orsay in Paris, France (1986), occupying a former train station, and Tate Modern (2000), which inhabits the carcass of a redundant interwar power station in London, England.

Millions visit major museums and galleries every year, but some of the world's most telling and legible collections are to be found in small museums. These include house museums, usually but not always associated with famous people, from composers and artists to writers and political leaders. The modest Zhou Enlai house museum in Shanghai, China, for instance, celebrates the man, his revolutionary colleagues, and his leadership in the twentieth century. Many nations have a full range of such institutions, from grand, state-sponsored collections and those of major philanthropists to local museums, which often serve as the best places to get a sense of how a particular village or trade went about its daily living and working life.

With the rise of the social history movement, which began in the 1960s, museums began to tell the stories of working people, women, and minorities. One of these, the Tenement Museum in New York (founded 1988), explores immigration to the US through the stories of the families from many countries who lived in the building between the 1860s and 1930s. Industrial museums, including the Ironbridge Gorge Museums in Shropshire, England (established 1968), chart industrial achievements, while railway museums collect and celebrate the spread of rail transport lines in the nineteenth and twentieth centuries. Railway museums are among the most common types in the world, along with war memorials and war museums, which can be found in almost every nation (for more on memorialization of war and conflict, see theme 10).

War museums, frequently state funded, are often very revealing—in both size and complexity of their collections and in their choice of architecture—about attitudes to war and the ideology of the state. Before World War I, military museums focused primarily on collecting weapons and other objects related to war, but in the wake of each of the world wars, there was a shift toward memorialization and honoring sacrifice. The 1980s saw another turn, this time toward interpreting the experience of war on both the battlefield and the home front and telling the stories of ordinary soldiers, women, and civilians.[22]

As the century advanced, museums also began to grapple with traumatic events. Many were, in fact, located at the site of the event. Efforts to create a memorial and museum at the former Auschwitz-Birkenau concentration and extermination camp in Oświęcim, Poland, began in May of 1945, only a few months after the camp's liberation; the museum opened in 1947 (inscribed WHL in 1979).[23] At Hiroshima, Japan, the Hiroshima Peace Memorial Museum was unveiled in 1955, displaying items salvaged in the aftermath of the atomic bomb (the Hiroshima Peace Dome was inscribed WHL in 1996). Robben Island in South Africa served as a prison for hundreds of years, most famously housing anti-apartheid political prisoners between 1961 and 1991. It became a museum in 1997, a year after the last prisoners had been released (inscribed WHL in 1999).[24]

Libraries, another cultural institution, multiplied around the world, albeit at different times and scales, accompanied by the expansion of library systems. Many countries built on older existing systems, while others—young postcolonial nations in particular—established or expanded libraries in the second half of the century.[25] The world's largest institutions—the British Library (London, England) and the US Library of Congress (Washington, DC)—continued to collect books and periodicals in hundreds of languages. Other national libraries, including those in France, Russia, China, and India, retained the largest collections of literature in their respective country's language; those in China and India were founded in the twentieth century. Worldwide, university and private libraries held vast archives and collections of books, but because access was often restricted to qualified users, public libraries and archives became critical for public access to books and materials.

At the dawn of the century, library book collections were often stored on multitiered, structural shelves that could accommodate their massive weight. These stacks were generally located away from public areas such as reading rooms, resulting in fixed-function library spaces. In the 1930s, the invention of adjustable, standardized, self-supporting metal stacks led to a modular approach to library design, which opened up interiors, allowed for direct public access to books, and provided flexibility in the use of spaces.[26]

Beginning in the 1960s and 1970s, retrieval systems in many large libraries became computerized, and libraries began exploring the use of computers to manage circulation data, cataloging, and other essential functions. Careful consideration of how technology could improve access to stored information led to the creation of online catalogs; by the 1980s, these were replacing traditional card catalogs and were soon followed by the digitization of collections.[27] From the late 1990s, more and more books, newspapers, and journals were published in both print and digital formats. The availability of digital media allowed libraries to expand their collections without concern for physical storage space. These technological advances brought further changes to the design of library buildings and the types of services they offered to their communities. As the twentieth century drew to a close, more local libraries were offering computer access not only to their own resources but also to the expanding world of the internet.

Photo Gallery

The table below lists a selection of subthemes and types of places related to theme 9 and is excerpted from "Twentieth-Century Themes, Subthemes, and the Places That Exemplify Them" (see pp. 10–15). It is followed by a gallery of photos showing a diverse range of buildings, sites, structures, and landscapes from around the world that exemplify the issues and subthemes discussed. The text accompanying each photo explains how that place represents the theme of the preceding essay. Some of these places may already be listed as heritage places (from local inventories to the World Heritage List) while others are not, though they *may* be identified as significant in the future. Some are specifically mentioned in the text; many are not. All are included here as exemplars to prompt broad exploration of potential heritage places.

Theme 9 RELIGIOUS, EDUCATIONAL, AND CULTURAL INSTITUTIONS

Subthemes	Types of Places
• Growth and decline of major religions • Impact of theological developments on the organization of worship spaces • Improved literacy and numeracy rates • Increasing role of governments in mass education • Expansion of all levels of public, private, and religious education • Changes in pedagogy • Growth of informal education through museums and libraries • Increased accessibility to museums and libraries • Educational and cultural institutions as expressions of national pride	• Houses of worship, convents, monasteries, shrines, and other sacred sites • Public and private elementary and secondary schools • Public and private colleges and universities • Religious educational institutions • Public playgrounds • Technical schools • Museums • Libraries • Cultural centers

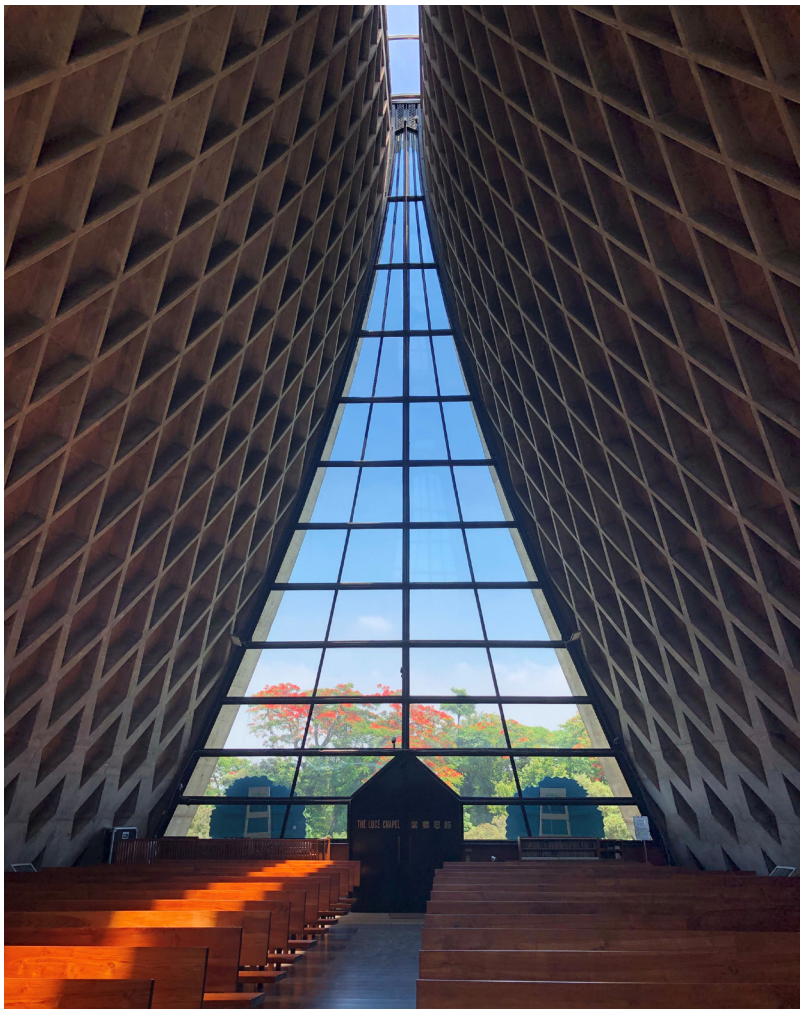

Figure 9.1. Luce Memorial Chapel, Tunghai University, 1962–63, Taichung, Taiwan. Tunghai University was founded by Methodist missionaries in 1955 as a comprehensive university. The campus chapel is named in honor of Henry W. Luce, the early twentieth-century US-born educator and Christian missionary. Located on a prominent site in the middle of the campus, the chapel stands as a symbol both of the centrality of Christianity to the school community and of missionary activity in China. It was designed in 1962 by Chinese-born American architect I. M. Pei, who blended modern design and materials, including in situ cast concrete, with traditional Chinese temple architecture, as expressed in its sweeping roofline.

Photo: 2019, ©Sheridan Burke.

Figure 9.2. Beth Sholom Synagogue, 1959, Elkins Park, Pennsylvania, USA. Originally located in North Philadelphia, Beth Sholom Congregation (founded 1918) moved to this new synagogue in suburban Elkins Park in 1959, following congregants who had relocated from the city, a phenomenon experienced by many faiths throughout North America and other parts of the world in the years following WWII. In his only design for a synagogue, US architect Frank Lloyd Wright worked closely with Beth Sholom's rabbi to fulfill the rabbi's vision of a simple, modern structure with a glass roof and rotunda that would seat more than 1,200 congregants. The finished building exhibits geometric motifs, colors, and textures typical of Wright's style, and the sanctuary's open, columnless interior is bathed in natural light that streams in through the soaring glass roof.

Photo: 2011, Smallbones, courtesy Wikimedia Commons, CC0 1.0.

Figure 9.3. Metropolitan Cathedral of Our Lady of Aparecida (Cathedral of Brasília), 1958–70, Brasília, Brazil. This architecturally bold cathedral was designed by Brazilian-born Oscar Niemeyer. It embodies shifts in architecture—toward an open plan and placement of the altar to bring the congregation closer to officiating priests, for example—related to twentieth-century liturgical developments in the Catholic Church. The tapered concrete supports reinforce the open, soaring space and reflect a new emphasis on structural innovation. The nonrepresentational design of Marianne Peretti's stained-glass windows (installed 1990) and the suspended sculpted angels by Alfredo Ceschiatti and Dante Croce (1970), both of which are pictured here, signaled a move away from figurative religious scenes to more abstract, nonfigurative art.

Photo: 2009, Cayambe, courtesy Wikimedia Commons, CC BY-SA 3.0.

Figure 9.4. Faisal Mosque, 1976–86, Islamabad, Pakistan. Named in honor of Saudi king Faisal bin Abdulaziz, who largely funded its construction, the Faisal Mosque was conceived as the national mosque of the young Islamic Republic of Pakistan. Designed by Turkish architect Vedat Dalokay, the central dome of the building is an eight-sided concrete shell inspired by the shape of a Bedouin tent, and is surrounded by four tall minarets. At the time of its construction, it was the largest mosque in the world; its worship hall can hold ten thousand worshippers, with room for tens of thousands more in its courtyard and porticoes. The mosque, situated on a prominent site at the foot of the Margalla Hills, is a major tourist destination.

Photo: 2017, Ghulam Ali Chishti, courtesy Wikimedia Commons, CC BY-SA-4.0.

Figure 9.5. Baha'i House of Worship (the Lotus Temple), 1980–86, New Delhi, India. Like all Baha'i houses of worship, this temple is characterized by a nine-sided construction to reflect the Baha'i belief in the mystical properties of the number 9. The building is composed of twenty-seven freestanding white, marble-clad "petals" arranged in clusters of three to form nine sides. Nine doors open onto the central prayer space, which holds twenty-five hundred people. Iranian-born architect Fariborz Sahba intended the structure to resemble a lotus flower—the Baha'i symbol of purity, beauty, and divinity—floating in a pool of water. The Lotus Temple has become a much visited tourist site that welcomes visitors regardless of faith.

Photo: 2012, Arian Zwegers, courtesy Wikimedia Commons, CC BY-2.0.

Figure 9.6. Monument to the Virgin of Peace (Monumento a la Virgen de la Paz), 1983, Trujillo, Venezuela. This statue of the Virgin Mary stands on a rocky site that is a place of Catholic pilgrimage; according to tradition, the Virgin appeared here in the year 1570. At a height of 47 meters (153 feet), the steel-framed concrete structure, the work of artist Manuel de la Fuente and engineer Rosendo Camargo, is one of the tallest monuments in Latin America. Today, the monument is also a tourist attraction. Its five viewing platforms offer spectacular views of the city and across most of the state of Trujillo, as well as part of the Sierra Nevada de Mérida and Lake Maracaibo.

Photo: 2013, Rjcastillo, courtesy Wikimedia Commons, CC-BY-SA 3.0.

Figure 9.7. St. Brendan's Community School, 1977, Birr, County Offaly, Ireland. A key example of Irish modernism by Dublin-based architects Peter and Mary Doyle, St. Brendan's is located in a rural landscape on the outskirts of Birr. It is intended to reflect Ireland's newly emerged educational ideal: free education for all. In anticipation of an influx of new students, the Doyles designed the school using modular components that could be added or removed as needed. The flexible interior space features an interior "street" where students can easily socialize and exchange ideas. St. Brendan's reflects the expansion of public education in many parts of the world in the second half of the twentieth century.

Photo: 2019, ©Sheridan Burke.

Figure 9.8. Quezon Hall, University of the Philippines Diliman, 1950, Quezon City, Philippines. Quezon Hall is the main administration building for the flagship campus of the University of the Philippines. The state university system was established by the Philippine legislature in 1908, when the island country was a US territory. Construction of the Diliman campus commenced in 1939, was halted during WWII, and resumed in 1949 with funding from the United States Philippines War Damage Commission. Quezon Hall, designed by Philippine architect Juan Nakpil, serves as a gateway to the campus.

Photo: 2013, Ramon F. Velasquez, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 9.9. Academic Quadrangle, Simon Fraser University, 1965, Burnaby, British Columbia, Canada. One of the earliest buildings at Simon Fraser University, the academic quadrangle, by Hungarian Canadian architect Zoltan S. Kiss, is a bold reinterpretation in concrete and glass of a centuries-old academic tradition. The campus's master plan, by Arthur Erickson and Geoffrey Massey, avoided the isolation of academic specializations typical of university campus design. Instead, it featured four clusters of buildings connected by a continuous pedestrian concourse to foster a sense of community and allow adaptability for future changes in response to educational need. Designed to be built in phases, the university opened in 1965, then expanded its student population as additional facilities were completed.

Photo: 2002, SFU Business, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 9.10. Institut du Monde Arabe (Arab World Institute), 1980–87, Paris, France. The institute, founded in 1980 to promote understanding of Arabic culture in France and throughout Europe, is a partnership between France and Arab League member states. Its mission is to reach out across nations and foster constructive cross-cultural dialogue through exhibitions, conferences and seminars, performances, and courses. Housing a museum, a large reference library, an auditorium, offices, and meeting rooms, the facility provides numerous opportunities for individuals to enhance their intellectual lives. The award-winning building, designed by French architect Jean Nouvel, features a stunning facade clad in photosensitive metallic apertures that were inspired by *mashrabiyas*—traditional Arabic latticework window coverings—that control the natural light entering the building.

Photo: 2008, jphilipg, courtesy Wikimedia Commons, CC BY-2.0.

Figure 9.11. National Museum of Anthropology, 1964, Mexico City, Mexico. Established in 1939, the National Museum of Anthropology is a symbol of Mexico's national identity. It accommodates the country's most important collections of both pre-Hispanic archaeological artifacts and modern Mexican ethnographic materials. Designed by Mexican architect Pedro Ramírez Vázquez with Jorge Campuzano and Rafael Mijares Alcérreca, the complex melds pre-Hispanic and modern architectural forms, materials, and techniques to create a harmonious relationship between collections and the buildings that house them. For instance, the visual integration of indoors and outdoors was a common characteristic of both Mayan and modern architecture. In the central patio, shown here, glass-walled galleries open onto the exterior landscape, which is shaded by a cantilevered, concrete, umbrella-like structure.

Photo: 2015, Ziko van Dijk, courtesy Wikimedia Commons, CC BY-SA 3.0.

Figure 9.12. Guggenheim Museum Bilbao, 1993–97, Bilbao, Spain. This world-famous museum, erected on the remains of a once-important industrial seaport, had a transformative effect on the city of Bilbao, replacing decaying dockyards and factories with a stunning work of contemporary architectural design, green spaces, and promenades. Opened in 1997, US architect Frank Gehry's innovative work attracted immediate and widespread critical praise and drew tourists to the region from around the globe. Its success demonstrated the potential for art and culture to transform a struggling economy.

Photo: 2009, Phillip Maiwald, courtesy Wikimedia Commons, CC BY-SA 3.0.

Figure 9.13. Accra Central Library, 1956, Accra, Ghana. The first national library system in sub-Saharan Africa was established in Ghana (then known as Gold Coast) in 1950, as the country was moving toward independence from Great Britain. Its objective was to improve literacy by building and operating libraries across the nation. The Accra Central Library, the work of British architectural firm Nickson and Borys, is a prime example of Tropical Modernism. Its brise-soleil facade (shown in the photo) shields the interior from direct sunlight and facilitates natural airflow. Many newly independent sub-Saharan countries wished to break from the past and express their hope for the future by constructing new public buildings in experimental styles such as this.

Photo: 2016, ©Iain Jackson.

Figure 9.14. National Library of Kosovo, 1974–82, Pristina, Republic of Kosovo. Located in the capital of Kosovo, this library is home to one of the world's largest collections of materials in the Albanian language and has archives of historic materials from the Ottoman, Yugoslav, and independent Kosovo periods. Since its founding in 1944, it has undergone a series of name changes as the state's political position has shifted. As a center of knowledge for Albanian Kosovans, it is viewed by many as a symbol of their cultural emancipation in the post-Yugoslav era. The building itself reinterprets in modern materials the domes and cubic motifs common in the traditional architecture of the region.

Photo: 2008, qiv, courtesy Wikimedia Commons, CC BY-SA-2.0.

NOTES

1. Todd M. Johnson and Brian J. Grim, "Table 1.2: Percentage of the World's Population Belonging to No Religion or Religion, 1910–2010," in idem, *The World's Religions in Figures: An Introduction to International Religious Demography* (Chichester, UK: Wiley-Blackwell, 2013), 12.
2. "Heritage of Religious Interest," UNESCO World Heritage Centre, accessed September 19, 2019, https://whc.unesco.org/en/religious-sacred-heritage/.
3. Max Roser, Hannah Ritchie, and Esteban Ortiz-Ospina, "World Population by Region," Our World in Data, 2013, last modified May 2019, https://ourworldindata.org/grapher/world-population-by-world-regions-post-1820; and Johnson and Grim, "Table 1.2," 12.
4. Anat Geva, "Introduction: Sacred Space," in *Modernism and American Mid-20th Century Sacred Architecture*, ed. Anat Geva (Abingdon, UK: Routledge, 2019), 1.
5. Albert Christ-Janer and Mary Mix Foley, *Modern Church Architecture: A Guide to the Form and Spirit of 20th Century Religious Buildings* (New York: Dodge Book Dept., McGraw-Hill, 1962), 60–61.
6. "Loi du 9 décembre 1905 concernant la séparation des Eglises et de l'Etat," Republic of France, Légifrance, accessed September 19, 2019, https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=LEGITEXT000006070169&dateTexte=20160802; and Jerome Bernard, "Church and State Disagree over Management of Religious Heritage in France," *The Art Newspaper*, April 16, 2019, https://www.theartnewspaper.com/analysis/church-and-state-disagree-over-management-of-religious-heritage-in-france.
7. Johnson and Grim, "Table 1.2," 12.
8. Rebecca Rogers and Carol O. Perkins, "Education," in *Oxford Encyclopedia of Women in World History*, ed. Bonnie G. Smith (Oxford: Oxford University Press, 2008), 2:140–57.
9. Max Roser and Esteban Ortiz-Ospina, "Literacy," Our World in Data, last modified September 20, 2018, https://ourworldindata.org/literacy. See also Max Roser and Esteban Ortiz-Ospina, "Global Education," Our World in Data, accessed September 19, 2019, https://ourworldindata.org/global-rise-of-education.
10. Bas van Leeuwen and Jieli van Leeuwen-Li, "Education since 1820," in *How Was Life? Global Well-Being since 1820*, ed. Jan Luiten van Zanden et al. (Paris: OECD, 2014), 88, https://www.oecd.org/statistics/how-was-life-9789264214262-en.htm.
11. Albert Ferrer, "Steiner and Montessori: Integral Education within a Spiritual World View," *International Journal of Education and Psychological Research* 7, no. 1 (March 2018): 1–8, http://ijepr.org/paper.php?id=415.
12. Anne-Marie Châtelet, "A Breath of Fresh Air: Open-Air Schools in Europe," in *Designing Modern Childhoods: History, Space, and the Material Culture of Children*, ed. Marta Gutman and Ning de Coninck-Smith (New Brunswick, NJ: Rutgers University Press, 2008), 107–27.
13. Lindsay Baker, *A History of School Design and Its Indoor Environmental Standards, 1900 to Today* (Washington, DC: National Clearinghouse for Educational Facilities, 2012), 8, http://www.ncef.org/pubs/greenschoolshistory.pdf.
14. Rosa Alonso I. Terme, *The Elimination of Primary Education Contributions for the Poor in Vietnam—A Case Study in the Political Economy of Pro-Poor Policies*, white paper (Washington, DC: World Bank, 2003), https://www.semanticscholar.org/paper/The-Elimination-of-Primary-Education-Contributions-Terme/e21cb02e3a6f2aff8620cd345d35556154548a16.
15. Baker, *History of School Design*, 11.
16. Robert McCarter, *Aldo van Eyck* (New Haven, CT: Yale University Press, 2015), 39–51; and Merijn Oudenampsen, "Aldo van Eyck and the City as Playground," *MO* (blog), March 27, 2013, https://merijnoudenampsen.org/2013/03/27/aldo-van-eyck-and-the-city-as-playground/.
17. Evan Schofer and John W. Meyer, "The Worldwide Expansion of Higher Education in the Twentieth Century," *American Sociological Review* 70, no. 6 (December 2005): 899.
18. Gili Merin, "AD Classics: The National Art Schools of Cuba / Ricardo Porro, Vittorio Garatti, Roberto Gottardi," *ArchDaily*, September 12, 2013, https://www.archdaily.com/427268/ad-classics-the-national-art-schools-of-cuba-ricardo-porro-vittorio-garatti-robert-gattardi/.
19. Max Roser and Esteban Ortiz-Ospina, "Tertiary Education," Our World in Data, accessed January 5, 2019, https://ourworldindata.org/tertiary-education.

20. Bryon MacWilliams, "Turkey's Old-Fashioned Distance Education Draws the Largest Student Body on Earth," *Chronicle of Higher Education* 47, no. 4 (September 22, 2000), A41.
21. Donald Horne, Susan Marsden, and Alison Painter, comps., *A Hidden Australian Cultural Resource: The Parallel Education System* (Melbourne: Monash University, 1993), 4.
22. Barton C. Hacker and Margaret Vining, "Military Museums and Social History," in *Does War Belong in Museums? The Representation of Violence in Exhibitions*, ed. Wolfgang Muchitsch, Edition Museumsakademie Joanneum 4 (Bielefeld: transcript Verlag, 2013), 41–59, https://www.transcript-verlag.de/978-3-8394-2306-6.
23. "History of the Memorial," Auschwitz-Birkenau Memorial and Museum, accessed September 9, 2019, http://www.auschwitz.org/en/museum/history-of-the-memorial/.
24. *Encyclopedia Britannica*, s.v. "Robben Island," last modified June 25, 2019, https://www.britannica.com/place/Robben-Island.
25. On the development of libraries by country or region, see Wayne E. Wiegand and Donald G. Davis Jr., eds., *Encyclopedia of Library History* (New York and London: Garland, 1994); and Robert Wedgeworth, ed., *World Encyclopedia of Library and Information Services*, 3rd ed. (Chicago: American Library Association, 1993).
26. David Kaser, "Library Buildings," in *World Encyclopedia of Library and Information Services*, ed. Robert Wedgeworth, 3rd ed. (Chicago: American Library Association, 1993), 479–80.
27. George S. Bobinski, *Libraries and Librarianship: Sixty Years of Challenge and Change, 1945–2005* (Lanham, MD: Scarecrow Press, 2007), 19–22. For a midcentury perspective on the use of technology in libraries, see J. C. R. Licklider, *Libraries of the Future* (Cambridge, MA: MIT Press, 1965).

Theme 10

War and Its Aftermath

War has been a constant feature across the span of human existence. In the twentieth century, however, the nature of warfare was markedly different than in previous centuries. Not only was it carried out on a much larger scale, it also engaged new, more deadly methods of combat. Some historians suggest that "warfare was...the single most pervasive driving force throughout the twentieth century."[1]

As the century opened, armed conflicts had just ended between Spain and the United States and were ongoing between Dutch colonists and insurgents in South Africa's Second Boer War, and between Russia and China in Manchuria. Over the ensuing decades, the world endured two world wars, a Cold War that persisted from 1945 to 1991, ethnic and religious cleansing on several continents, a number of postcolonial conflicts as former colonies became sovereign nations, and a multitude of civil wars; these and similar struggles continued throughout the century. One major effect of these seemingly never-ending conflicts was the forced mass migrations of people. Another was the creation of sites to commemorate and memorialize these conflicts and their casualties; such sites became key indicators of postwar recovery. In addition, the latter part of the century saw the rise of international terrorism, whose proponents rebelled against perceived religious, ethnic, social, economic, or political enemies.

The Nature of Warfare in the Twentieth Century

Throughout time, from small skirmishes to major upheavals, armed conflicts have shaped human societies, land use, and ways of building. What makes the twentieth century stand out is not only the unprecedented scale of wars—the large number of nations and people involved, amount of weaponry manufactured and discharged, and number of human casualties—but also the dramatic advances in weaponry and other military technology. These range from machine guns, tanks, and submarines to aircraft carriers, nuclear weapons, and intercontinental missiles. Airplanes first came into wide use as offensive weapons during World War I (WWI). As the century progressed, strategic bombers were

deployed, and supersonic fighter aircraft, stealth bombers, drone aircraft, and attack helicopters became perhaps the most dominant feature of later wars.

Compared to earlier times, the very nature of war also changed dramatically in the twentieth century.[2] Wars were no longer defined by campaigns, and battles were fought between more or less professional soldiers on fairly clearly defined battlefields. Twentieth-century armies consisted mostly of civilians who had volunteered or were drafted into the military. Furthermore, civilians and towns often became primary targets themselves. The advent of aerial warfare, particularly the idea of "morale bombing"—designed to break an enemy population's will to carry on the fight—led to the wholesale destruction of historic city centers and the indiscriminate killing of their inhabitants.[3]

Aggression and warfare against civilians became increasingly frequent even in democratic nations, let alone in those ruled by totalitarian regimes. Propaganda and ideology were intended to dehumanize the enemy—be they people of a different nation, ethnicity, creed, or political persuasion—thus paving the way for horrendous acts of genocide, ethnic and religious cleansing, extermination, and incarceration, in addition to the forced migration of great numbers of people. Such warfare against civilians may well be regarded as one of the underlying causes of international terrorism, which has become a growing threat since the 1970s (discussed further below).

Together, the preparation for and waging of war has always produced many diverse sites, such as army barracks, naval bases, and fortification systems. Again, the twentieth century ushered in not only a change in scale but also new types of places, including air bases and underground missile silos. An unprecedented number of prisoners of war, as well as forced laborers and prisoners of different categories, were housed in camps.

An end to hostilities usually meant that survivors now were faced with a new set of problems. Twentieth-century wars produced wide areas of environmental devastation: the Red Zone (*Zone Rouge*) of WWI in France, for example, or the 20,000 square kilometers of forest in Vietnam destroyed by Agent Orange, deployed by the US between 1961 and 1971 as part of its herbicidal warfare program.

During WWI, the use of chlorine gas, phosgene, and mustard gas rained new horrors upon unsuspecting combatants. Chemical weapons continued to be used against both enemy troops and civilians throughout the century: Italy unleashed mustard gas in Ethiopia in 1935; Germany used poison gas to exterminate concentration camp inmates in the 1940s; in Vietnam, the US military employed the incendiary substance napalm in addition to Agent Orange in the 1960s and 1970s (the US first used napalm as a weapon during World War II [WWII]); and Iraqi president Saddam Hussein used chemical weapons on his own people in the 1980s.[4]

Another tragic consequence was the unprecedented scale of the migration of people forced to flee their homelands. In the 1910s, in addition to WWI refugees, Armenians fled Turkey to escape genocide, Mexicans were displaced by their country's decade-long revolution, and Russians fled following the Russian Revolution, which began in 1917. From the 1920s through the 1940s, thousands of Chinese sought refuge from civil wars, and many Palestinians fled their country after the establishment of Israel in 1948. As a result of independence from Great Britain and partition of the Indian subcontinent into the nations of India and Pakistan, thousands of Muslims and Hindus were displaced in 1947. A decade later, thousands of Cubans left their native island after the Cuban Revolution erupted in 1959. In the

1960s, as Cold War tensions in Southeast Asia escalated into a "hot war," innumerable refugees fled, many in small vessels. In Nigeria, the 1967 civil war resulted in major displacement of citizens. Decades later in Africa, the number of refugees mounted due to the Somali Civil War beginning in 1991 and the Rwandan genocide in 1994.

These traumatic events, as well as the tragic deaths of soldiers and civilians, called for acts or sites of memorialization not only to honor the dead and, in the case of victorious nations, to celebrate the victory but also perhaps to help survivors come to terms with their loss and their grief. Rituals of remembrance were established with growing frequency, for instance near the beaches of Normandy, France, in recognition of D-Day in 1944. Many are repeated on specific dates; at the Menin Gate in Ypres (now Ieper), Belgium, every single evening to the present day buglers perform the Last Post to honor casualties of WWI. There are sites and quite large areas—the battlefields of particularly bloody engagements, or the sites of atrocities—that have acquired high significance as traumascapes, giving rise to the phenomenon of "dark tourism," which seeks out places connected to human suffering and horror.[5]

Global War and Civil War

The Great War, or World War I (1914–18), was fought on an industrial scale and involved many of the world's most economically powerful countries, their allies, and their colonies. The war had profound, long-lasting effects both in and beyond Europe. First, it led to the deaths of some 8.5 million soldiers from injury or disease; civilian deaths attributed to the war have been estimated at 13 million.[6] Second, many nations had prepared in advance for the war, building military barracks, laying out proving grounds and training areas, and establishing factories for various kinds of military material. All these construction activities vastly increased during the conflict, as did the erection of factories to create airplanes, tanks, and other new instruments of warfare. Third, in some countries, so many men were conscripted as soldiers that women on "the home front" began joining the workforce in places and occupations that had previously been exclusively male dominated. This expansion in women's roles later helped drive the fight for women's rights and suffrage in many places. Fourth, the war affected many existing buildings through widespread requisition. Countless country houses were taken over by the military to house service institutions such as hospitals, thus adding a significant chapter to their histories. Trench warfare and the wholesale destruction caused by massive artillery bombardments left behind areas of utter desolation, particularly along the western front in France and Belgium. Not even the most venerated historic monuments—medieval cathedrals and castles—were exempt from deliberate attack, and those that survived bore the indelible traces of war.

WWI has been described as the "great seminal catastrophe" of the century in the sense that it led to subsequent upheavals around the globe.[7] These include the Russian Revolution (1917–23); the rise to power of the Nazis in Germany, which sparked expansive and aggressive regimes in Europe; and the Japanese incursion into China in the 1930s, which destabilized the situation in East Asia. The Paris Peace Treaty at the end of WWI resulted in either the drawing or the alteration of many national boundaries, leading in turn to conflicts that persisted throughout the century.

The two decades between world wars were characterized partly by local and civil wars, such as those in eastern and southern Europe, where emerging Soviet Russia sought to impose its dominance; in the Middle East, where the British Empire fought to retain control; in China, where nationalists battled communists from the 1920s to the 1940s; and in Spain, where a civil war (1936–39) between Republican and fascist forces, each side supported by foreign powers, heralded the shape of an imminent, global armed conflict. At the same time, the lessons of the Great War and the fear of another armed conflict led to the building of vast fortifications such as the French Maginot Line and the German West Wall, or Siegfried Line, and inspired construction of a spate of military installations—barracks, airfields, harbors—in many countries.

In some parts of the world, the cataclysm and trauma of WWII (1939–45) overshadowed even that of WWI. Many of the massive fortifications and bunkers that had been built at huge expense would prove useless, overwhelmed by more advanced technology and innovative tactics. WWII was not restricted to the front lines; instead, it was very much a war of movement fought not only on land and sea but also to a large extent in the air. Naval and aerial warfare left thousands of wrecks on the bottom of the ocean, from the carcasses of battleships, aircraft carriers, and submarines to those of bombers and fighter aircraft. Countless merchant ships were sunk by enemy forces attempting to blockade supply routes, since many of the warring nations needed material from faraway allies. All told, the naval, aerial, and amphibious warfare in the Pacific theater played out over sweeping areas.

Motivated by aggressive racism or ideology, Nazi Germany, the Soviet Union (USSR), and the militarist Japanese Empire physically exterminated people they saw as enemies. The Nazis murdered six million Jews and numerous members of diverse minority groups, often in industrialized death camps. Three million Soviet prisoners of war did not survive captivity in Germany, and an even greater number of people were killed in the Soviet Union for the "crime" of being considered members of a wealthy class. For their part, the Japanese military deemed it acceptable to work prisoners of war to death.

The final phase and aftermath of WWII, including the reallocation of territories and the redefinition of national borders, saw the enforced migration of vast numbers of people from many nations. It was a process that cost thousands of lives and left survivors traumatized, particularly those who found themselves living in refugee camps, sometimes for decades, with no prospect of either returning to their homes or integrating into the state or nation that tolerated them within its borders.

The Cold War: Capitalism vs. Communism

Having jointly defeated Hitler's Germany, the communist USSR and its former capitalist allies found themselves staring across an ideological divide. They soon embarked on a trial of strength, leading to the Cold War, which pitted the two opposing blocs against each other. The US government's use of the atomic bomb on the Japanese cities of Hiroshima and Nagasaki in August 1945 had forever changed the nature of warfare. In the escalating nuclear arms race between the US and the USSR (subsequently joined by Great Britain, France, and China), opponents soon amassed nuclear arsenals capable of destroying the entire planet many times over.

While smaller, "conventional" wars continued through the rest of the century, the possibility of global annihilation produced an uneasy standoff. Time and again, crises arose that threatened to turn the Cold War into a hot war. These include the confrontation between US and Soviet tanks at Checkpoint Charlie in Berlin, Germany, in 1961, as well as the Soviets' attempt to station nuclear missiles on Cuba in 1962, after that island's young socialist government had successfully fought off the US-supported counterrevolutionary action known as the Bay of Pigs invasion.

In the context of the Cold War, various armed conflicts, sometimes called proxy wars, erupted intermittently. The Korean War (1950–53), the Vietnam War (1955–75; known in Vietnam as the American War), and the Soviet-Afghan War (1979–89) are three conflicts in which the superpowers, the US and USSR but also China, were heavily involved. All three came at tremendous cost, both in terms of human lives and in a material sense.

Large numbers of intercontinental missiles were set up in bunkers in the US and the Soviet Union, while fleets of missile submarines and strategic bombers patrolled from their expansive bases, always ready to engage in all-out war. The interstate highways criss-crossing the US, authorized by the Federal-Aid Highway Act of 1956 (popularly known as the National Interstate and Defense Highways Act), primarily served strategic purposes. Many nations turned to building civil defense systems and nuclear shelters, sometimes to protect only their leaders in the event of a nuclear war but in other cases for civilian populations as well, perhaps nowhere on the scale of neutral Switzerland, which succeeded in providing 1.14 shelter places per citizen.[8] The budding antinuclear movement gained widespread acceptance in the 1980s; the peace camp of Greenham Common, a Royal Air Force Base in England where nuclear weapons were based, was one significant site of protest.

The permanent stalemate of the Cold War led to the physical fortification of borders as well as the nonphysical Iron Curtain erected by the USSR as a military, political, and ideological barrier to isolate itself and its dependent Central and Eastern European allies from the West. Its only loophole was Berlin, which was jointly occupied and administered by the four Allied powers (France, England, USSR, and the US). Millions of East Germans escaped through Berlin into the West until the Berlin Wall was erected in August 1961 by the communists to prevent further loss of their workforce. The fall of the Berlin Wall, in a bloodless revolution on November 9, 1989, heralded the collapse of Soviet-led communism and a reorganization of states throughout Eastern Europe. Walls were also erected in other areas of conflict, separating Greeks and Turks in Cyprus, Israelis and Palestinians in the West Bank, and Catholics and Protestants in Belfast, Northern Ireland.

Postcolonial and Civil Conflicts and Terrorism

The second half of the century was marked by countless armed conflicts around the globe, including postcolonial and civil wars. Postcolonial struggles, both during and after WWII, raged in French Indochina (1950s) and Dutch-controlled Indonesia (late 1940s). In the aftermath, the colonies of the British Empire and European powers called increasingly for independence. All would gain it eventually, but often only after long, drawn-out, and violent attempts by the European colonial states to retain their dominance.[9] Warring tensions rose between colonial dominators and independence-hungry residents throughout much of Africa in the 1960s and 1970s, resulting in the creation of a spate of newly in-

dependent nations: Angola, Guinea-Bissau, and Mozambique emerged from Portuguese colonies; Algeria, Morocco, and Tunisia from French rule; Congo, Rwanda, and Burundi from Belgian colonies; Libya and Ethiopia from Italian colonies; and Ghana, Rhodesia (Zimbabwe), South Africa, Nigeria, and Kenya from British rule.

Decolonization sometimes led to the separation of populations by religion or ethnicity, contributing further to tensions and violence (for more on decolonization and postcolonialism, see theme 6). In the postcolonial era, wars were waged between India and Pakistan, between Israel and neighboring Arab states, between Iran and Iraq, and in Africa, Latin America, Asia, and the Balkans. The Nigerian Civil War over Biafra in the late 1960s, the infamous "killing fields" of the Cambodian Civil War of the 1970s, and the Bosnian War of the early 1990s were characterized by horrendous atrocities and the mass expulsion or murder of civilians, often motivated by an effort to create an ethnically or religiously homogeneous population. The term *ethnic cleansing* came into use in the 1990s.[10]

Terrorism—the systematic use of fear or violence to bring about a desired political objective—has been practiced throughout history by both state and nonstate actors as a means of bringing about a variety of political, nationalistic, or religious ends that run from reactionary to revolutionary. In the twentieth century, terrorism was employed by a number of political and social movements around the globe, including totalitarian states against their own citizens, groups on both sides of anticolonial or religious conflicts, disputes over contested homeland, and political conflicts between a government and internal revolutionaries. From the 1970s on, terror campaigns were carried out on an international level. Their effectiveness was aided by such twentieth-century technological advances as automatic weapons and electronically detonated compact explosives, as well as the spread of air travel, which not only gave attackers greater mobility but also literally turned planes into weapons. To generate widespread fear, terrorists engaged in increasingly violent and dramatic attacks, often in public places—schools, stadiums, office buildings, transit stations, cafes, nightclubs—where civilians congregated as they went about their daily lives, destroying their sense of security. Tourist attractions and places of symbolic importance were also targeted.[11] Near-instantaneous reports of attacks on television and through other mass media spread fear far beyond the immediate target. On September 11, 2001, a major attack on New York's World Trade Center and other US targets ushered in a new series of early twenty-first-century conflicts worldwide.

Buildings, Sites, and Memorials Related to War

Military architecture of earlier centuries—such as medieval castles, town walls, and baroque fortresses—has long been accepted as heritage. Historic battlefields serve as both commemorative sites and tourist attractions, their violent associations softened by the passing of time. However, fortifications, barracks, missile silos, and radar installations of the last century, not to mention the places of mass death, are not seen in the same sympathetic light by most people. Instead, they are uncomfortable reminders of the limitless violence of conflict. These places are often ignored, and many have already been eradicated. The military itself tends to remove and replace obsolete installations routinely. Many impressive sites, such as the vast boneyard of Davis-Monthan Air Force Base, holding thousands of obsolete military aircraft in the dry air of Tucson, Arizona, are transitory in nature. Even the bloodiest

battles of the world wars have left few immediate traces of fighting except where damaged buildings are deliberately preserved as silent witnesses, as in Stalingrad (Russia), Hiroshima (Japan), and Oradour-sur-Glane (France). Battlefields, concentration camps, and sites of atrocities have become traumascapes, resonant with visitors attuned to this "dark heritage" but often empty of visible remnants (for more on dark heritage, see theme 7).

On the other hand, visibility and permanence are certainly intended for the monuments that have been created in countless places to commemorate wars, battles, and the deaths of soldiers and civilians. The desire for commemoration has spawned the creation of cemeteries and memorials, often of great artistic impact, such as those founded by the Commonwealth War Graves Commission to honor the dead of the two world wars.[12] The Great War marked a turning point in the treatment of casualties. Along the western front, hundreds of carefully designed military cemeteries provided individual graves for all of the fallen whose bodies could be recovered and identified, perhaps for the first time in human history; grand monuments recorded at least the names of those who had disappeared without a trace.[13] Similarly, official monuments and memorials were raised in places large and small in most of the countries that had lost soldiers.

Memorials are frequently erected in national capitals, major cities, and small towns to recognize sacrifices made in specific wars. The National Mall in Washington, DC, for example, holds reminders of several twentieth-century conflicts, including the Korean War Veterans Memorial (dedicated 1995) and the Vietnam Veterans Memorial (1982).[14] In Italy's Veneto region, several monuments recall the country's significant losses in WWI, including those in Udine and Treviso and the Redipuglia Military Memorial near Monfalcone. Erected by Mussolini's fascist government, these huge memorials extol militarist ideals and were intended to prepare the nation for future wars. In London in 1920, the Cenotaph (a stone pylon representing an empty tomb) commemorated slain soldiers and became a model for similar memorials in England, Canada, New Zealand, and Hong Kong.

Postwar Recovery and Reconstruction

In peacetime, survivors must come to terms with destruction and start anew. Ravaged towns and villages have been rebuilt according to modern standards, but in the twentieth century, efforts were also made to recover and reconstruct the lost qualities of historic towns and monuments destroyed by fighting. Following WWI, frontline towns such as Arras, France, were rebuilt to resemble their historic appearance as it evolved over the course of centuries, often combining painstakingly accurate reconstructions of important buildings with more fanciful, atmospheric re-creations of residential streets. In Warsaw, Poland, where the city center and royal palace were razed by the Germans in WWII for the express purpose of striking at the cultural heart of the Polish people, the precise reconstruction achieved in the following two decades was a source of national pride and a reassertion of national identity (for more on historical reconstructions, see theme 7).

In general, however, after WWII, conservative rebuilding with the intention of regaining lost qualities remained the exception. Under the influence of modernism, urban planners and architects in many countries perceived the bombing of historic city centers as a "blessing in disguise," creating a tabula rasa for new structures and spaces.[15] One can see the varying effects of these efforts in Coventry,

England, after WWII and in Beirut, Lebanon, after the Lebanese Civil War (1975–90). The rebuilding of war-damaged cities based on different street patterns and on an entirely different scale often amounted to a second destruction, causing even greater loss of heritage values than the war itself did. Nevertheless, some of these postwar developments and cities have since acquired heritage significance and protection and, in the case of Le Havre, France, World Heritage status.

War also impacted the built environment in locales that never even saw battle. The military provided many servicemen and -women with their first glimpses of the world beyond their hometowns. These young lives were exposed to new cultures, foods, experiences, sights, and architectural styles. At war's end, they brought these experiences home with them. Some entered the professions of architecture, engineering, or city planning, incorporating what they had witnessed and learned into their work. The result was a lasting impact on architecture, home construction, and land use patterns in places around the world.

Photo Gallery

The table below lists a selection of subthemes and types of places related to theme 10 and is excerpted from "Twentieth-Century Themes, Subthemes, and the Places That Exemplify Them" (see pp. 10–15). It is followed by a gallery of photos showing a diverse range of buildings, sites, structures, and landscapes from around the world that exemplify the issues and subthemes discussed. The text accompanying each photo explains how that place represents the theme of the preceding essay. Some of these places may already be listed as heritage places (from local inventories to the World Heritage List) while others are not, though they *may* be identified as significant in the future. Some are specifically mentioned in the text; many are not. All are included here as exemplars to prompt broad exploration of potential heritage places.

Theme 10 WAR AND ITS AFTERMATH

Subthemes	Types of Places
• Changing nature of warfare • War on a global scale: the two world wars • Expansion of the roles of women and minorities in wartime • Civil wars • Redrawing of national boundaries • Genocide and ethnic and religious cleansing • Forced mass migrations • The Cold War • Revolution and counterrevolution • Decolonization and wars of independence • Growth of terrorism • Memorialization of war and conflict • Postconflict recovery and reconstruction	• Battlefields • Military structures and installations • Missile sites • Sites associated with civilian participation in war efforts • Prisoner-of-war camps and forced-labor camps • Sites of atrocities and trauma • Concentration and extermination camps • Shipwrecks and other submerged wreckage • Nuclear test sites and underground nuclear silos • Civil defense sites • Military cemeteries • Memorials and monuments • Cities, towns, and landscapes reconstructed after being damaged by war

Figure 10.1. Battery Heerenduin, ca. 1942–44, IJmuiden, the Netherlands. This concrete bunker is an artifact of the Atlantic Wall, a system of coastal fortifications erected by German forces during WWII as a defense against the Allied invasion of Nazi-occupied Europe. The wall ran from northeastern Norway to France's border with Spain. Often evoked in Nazi propaganda, it was maintained by thousands of German troops and incorporated standard features and equipment, including guns, batteries, mortars, and artillery. More than six hundred approved types of bunkers and casemates helped make up the fortification system and were updated often.

Photo: 2010, Janericloebe, courtesy Wikimedia Commons, public domain.

Figure 10.2. Joint Security Area, Demilitarized Zone (DMZ) at Panmunjom, 1953–present, border between North and South Korea. Established in 1953 shortly after a truce was signed between North and South Korean forces, this is the only location along the DMZ where soldiers on either side face off directly. In the photo, taken looking north, the shift from one type of stone to another between the blue buildings marks the physical border between the two Koreas. In 2018, officials from each country, under mutual agreement, removed all arms from the area.

Photo: 2008, Henrik Ishihara, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 10.3. Berlin Wall Memorial, dedicated 1998, Berlin, Germany. From 1961 to 1989, a barbed-wire and cinder-block wall (later replaced by concrete) divided the city of Berlin, encircling its western half and preventing the citizens of communist East Germany from escaping to the West. The border fortifications—forty-four kilometers (twenty-seven miles) in length—were largely dismantled after the wall fell in 1989. This memorial landscape, on Bernauer Strasse, features the longest stretch of extant border wall (facing West Berlin). All elements of the death strip survive, including a watchtower, floodlights, and a patrol road, as well as various fortifications (facing East Berlin). It serves as the central site of commemoration for the victims of the Berlin Wall.

Photo: 2016, Domaine public, courtesy Wikimedia Commons, CC0 1.0.

Figure 10.4. Cu Chi Tunnels, 1960s–1970s, Ho Chi Minh City, Vietnam. The tunnels of the Cu Chi district of Ho Chi Minh City formed part of a large network of connecting underground tunnels dug by the Vietcong during the war with the US, which ended in 1975. Dark, cramped, and unsanitary, the tunnels served as hiding places for planning military strategy and as secret transportation routes for both soldiers and supplies. They were instrumental in the North Vietnamese resistance. A 121-kilometer- (75-mile-) long area has been preserved as a war memorial, with some sections open to tourists.

Photo: 2009, Dennis Jarvis, courtesy Flickr, CC BY-SA-2.0.

Figure 10.5. Memorial Hall to the Victims in the Nanjing Massacre, built 1985, extended 1995, Nanjing, China. In late 1937 and early 1938, Japanese military forces seized control of this once-capital city and massacred approximately three hundred thousand residents. This memorial was erected at one of the burial sites in southwestern Nanjing. It consists of outdoor displays, a sheltered area where skeletal remains of the victims can be viewed, and a tomb-like exhibition hall—half underground—featuring photographs and other historic documents.

Photo: 2017, 維基小霸王, courtesy Wikimedia Commons, CC BY-SA-4.0.

Figure 10.6. Auschwitz Concentration Camp, 1940–45, Auschwitz, Poland. Originally built as an army barracks, Auschwitz was converted into a prison after Nazi Germany invaded Poland in September 1939. Consisting of a main camp (Auschwitz I), a nearby extermination site (Auschwitz II-Birkenau), and a number of subcamps, Auschwitz remains a powerful symbol of the Holocaust, in which millions of Jews and others perished. Prisoners were transported here and to other camps, often by train, and were forced into labor, tortured, and killed by the Nazis. A museum was created at Auschwitz in 1947, and the site was inscribed on the World Heritage List in 1979.

Photo: 2018, Peter Tóth, courtesy Pixabay.

Figure 10.7. Hiroshima Peace Memorial (Genbaku Dome), 1945, Hiroshima, Japan. This World Heritage Site commemorates the victims of the atomic bomb dropped over Hiroshima by US forces on August 6, 1945, effectively ending WWII in the Pacific and ushering in the nuclear age. Opened in 1915 as the Prefectural Industrial Promotion Hall, the Genbaku Dome (A-Bomb Dome) was the only structure left standing near the point of impact. From 1950 to 1964, construction took place of the adjacent Hiroshima Peace Memorial Park. In 1966, the city resolved to preserve the dome, in its ruined state, as a symbol both of the fight to abolish nuclear weapons and of the hope for world peace.

Photo: 2013, Oilstreet, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 10.8. Prisoner's bed at Tuol Sleng Genocide Museum, 1976–79, Phnom Penh, Cambodia. In 1976, this public school was converted into an interrogation center and prison by the Marxist-nationalist Khmer Rouge one year after the regime gained control in Cambodia. Known as Security Office 21, this complex was one of at least 150 torture and execution centers operated by the Khmer Rouge until its defeat in 1979. An estimated fifteen thousand to twenty thousand people were imprisoned here; all but twelve perished. In 1980, the site became a museum, with many spaces (such as the one shown here) deliberately left unrestored. A photograph (visible on the left wall) depicts its condition in 1979.

Photo: 2012, Justin Vidamo, courtesy Flickr, CC BY-2.0.

Figure 10.9. Bisesero Genocide Memorial, 1994, Bisesero, Rwanda. This memorial is one of six centers in Rwanda commemorating the genocide of the Tutsi people during the ethnic war that erupted between rival Hutu and Tutsi groups in April 1994. Severe tensions between these groups already existed in the context of the independence of Rwanda and its neighboring country to the south, Burundi, from Belgium in 1962. In 1994, more than forty thousand were killed in the Bisesero area before French-led forces intervened in what is known as Operation Turquoise.

Photo: 2012, Adam Jones, PhD, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 10.10. Artillery on deck of the sunken *Nippo Maru* at Truk (now Chuuk) Lagoon, 1944, Chuuk State, Federated States of Micronesia. During WWII, Truk served as the Imperial Japanese Navy's main South Pacific base. In February 1944, the US decimated the Japanese fleet in a massive airstrike. Forty-five ships, including the *Nippo Maru*, were sunk, and more than four thousand Japanese lives were lost. Because the underwater wreckage contains human remains, it is classified as a Japanese war grave and has been designated a monument by both the Micronesian and US governments. The relics, now encrusted in coral, attract a diversity of marine life as well as scuba divers, but oil leaks pose a hazard to the marine environment and to the wrecks themselves.

Photo: 2006, Chris A. Crumley / Alamy Stock Photo.

Figure 10.11. Former Titan II missile silo, Titan Missile Museum, 1963–84, Sahuarita, Arizona, USA. The Titan II missile, developed by the US during the Cold War with the USSR, was the country's largest operational, land-based, intercontinental nuclear missile. Fifty-four such weapons were distributed throughout the country as a deterrent to a nuclear attack; this is the only one that is extant. Deactivated in the later years of the Cold War, the 103-foot- (31-meter-) tall missile, its nesting silo, and related infrastructure were converted into a museum in 2004.

Photo: 2010, Sam Howzit, courtesy Flickr, CC BY-2.0.

Figure 10.12. Lone Pine Cemetery and Memorial, 1915, Gallipoli, Turkey. In 1915, soldiers of the Australian and New Zealand Army Corps (ANZAC) engaged in brutal battles with Turkish forces on the Gallipoli Peninsula as part of the WWI Allied offensive against the Ottoman Empire. This site commemorates the nearly five thousand ANZAC soldiers who lost their lives. The Gallipoli Campaign, as the operation is called, is foundational to the national identities of both Australia and New Zealand. Lone Pine is one of more than twenty-five hundred cemeteries and two hundred memorials to the two world wars established, managed, and maintained by the Commonwealth War Graves Commission, an intergovernmental organization of the United Kingdom, Canada, Australia, New Zealand, India, and South Africa.

Photo: 2011, Adam Jones, courtesy Wikimedia Commons, CC BY-SA-2.0.

Figure 10.13. Chaco War Memorial, 1970s, Yacuiba, Bolivia. Located in Yacuiba's main plaza, this memorial pays homage to both the heroes of independence in the nineteenth century and the fallen Bolivian soldiers of the Chaco War. The latter conflict, between Bolivia and neighboring Paraguay (1932–35), was fought over control of the northern part of the Gran Chaco region, believed to be rich in oil. The war is represented by the sculptural group that rests on top of a pedestal above the classical colonnade, as shown in the photo.

Photo: 2011, Santamaj, courtesy Wikimedia Commons, CC BY-SA-3.0.

Figure 10.14. Zaisan Memorial, 1971, Ulaanbaatar, Mongolia. This Soviet-built memorial honors Soviet soldiers who died in WWII and celebrates the relationship between Mongolia and the USSR. During the war, Mongolia provided troops as well as agricultural, industrial, and financial support to the USSR's war effort. The circular monument features a socialist-realist tile mural depicting scenes of friendship between the Mongolian and Soviet peoples. Scenes include the defeat by Soviet and Mongolian forces of the Japanese at Khalkhin Gol in 1939 on the Mongolian border, and the victory over Germany in 1945.

Photo: 2013, Gereltuv Dashdoorov, courtesy Wikimedia Commons, CC BY-SA 4.0.

Figure 10.15. Martyrs' Memorial, 1982, El Madania, Algiers, Algeria. Situated on a prominent hilltop site, this soaring concrete memorial honors the Algerians who perished in the war of independence from France (1954–62), which in turn inspired other African independence movements. The war also contributed to changes in France itself, as seen in the large numbers of Algerian refugees who immigrated to France. This memorial derives its form from the abstracted depiction of three palm leaves, each with a sculpture of a soldier at its base. Where they converge at the top, the leaves shelter an eternal flame. The memorial opened to mark the twentieth anniversary of Algerian independence.

Photo: 2018, Habib Kaki, courtesy Flickr, public domain.

Figure 10.16. Vukovar Water Tower, built 1968, damaged 1991, Vukovar, Croatia. This concrete ruin—once a water tower with a popular restaurant near its summit—has become a symbol of the war between Serbia and Croatia, one major outcome of the dissolution of Yugoslavia following the death of President Josip Broz Tito in 1980. In August 1991, Serbian forces began an eighty-seven-day-long siege of Vukovar in which much of the city was destroyed. This water tower was a frequent target of artillery bombardment. The tower ruin has been stabilized and stands as a testament to these war-related events.

Photo: 2010, anjči, courtesy Wikimedia Commons, CC BY-2.0.

NOTES

1. C. A. Bayly, *Remaking the Modern World, 1900–2015: Global Connections and Comparisons* (Hoboken, NJ: John Wiley & Sons, 2018), 7.
2. For a brief summary of warfare in the twentieth century, see Eric Hobsbawm, "War and Peace in the 20th Century," *London Review of Books* 24, no. 4 (February 21, 2002): 16–18.
3. Igor Primoratz, ed., *Terror from the Sky: The Bombing of German Cities in World War II* (New York: Berghahn Books, 2010).
4. Sarah Everts, "A Brief History of Chemical War," *Distillations* (blog), Science History Institute, May 11, 2015, https://www.sciencehistory.org/distillations/magazine/a-brief-history-of-chemical-war/.
5. John Lennon and Malcolm Foley, *Dark Tourism: The Attraction of Death and Disaster*. London: Continuum, 2000; and Dark-Tourism.com (website), accessed October 15, 2019, http://www.dark-tourism.com.
6. *Encyclopedia Britannica*, s.v. "World War I," by John Graham Royde-Smith and Dennis E. Showalter, last modified November 1, 2019, https://www.britannica.com/event/World-War-I.
7. George F. Kennan, *The Decline of Bismarck's European Order: Franco-Russian Relations, 1875–1890* (Princeton, NJ: Princeton University Press, 1979), 3.
8. This figure is as of 2006. Daniele Mariani, "Prepared for Anything: Bunkers for All," SWI swissinfo.ch, July 3, 2009, https://www.swissinfo.ch/eng/prepared-for-anything_bunkers-for-all/995134.
9. Walter Rodney, *How Europe Underdeveloped Africa*, rev. ed. (Baltimore: Black Classic Press, 2011); and Thomas Pakenham, *The Scramble for Africa, 1876–1912* (New York: Random House, 1991).
10. "Ethnic Cleansing," United Nations Office on Genocide Prevention and the Responsibility to Protect, accessed October 15, 2019, https://www.un.org/en/genocideprevention/ethnic-cleansing.shtml.
11. *Encyclopedia Britannica*, s.v. "Terrorism," by John Philip Jenkins, last modified October 26, 2018, https://www.britannica.com/topic/terrorism.
12. Commonwealth War Graves Commission (website), accessed October 15, 2019, https://www.cwgc.org/.
13. George L. Mosse, *Fallen Soldiers: Reshaping the Memory of the World Wars* (New York: Oxford University Press, 1990), 80–83.
14. Apart from the names of 58,000 dead listed on the Vietnam Veterans Memorial, perhaps its most poignant component is the vast warehouse that preserves the thousands of mementos left at the wall by visitors: http://www.vvmf.org/items/.
15. Jörn Düwel and Niels Gutschow, *A Blessing in Disguise: War and Town Planning in Europe 1940–1945* (Berlin: DOM Publishers, 2013).

Conclusion

Taking on the task of creating a global thematic framework for the entire twentieth century is an ambitious project, as every culture and place has its own history and each values its heritage in different ways. The twentieth century was a period of rapid change that challenged the experience and perceptions of most aspects of daily life, work, communication, education, transport, trade, leisure, culture, and science, as well as the conduct of warfare. These developments are embodied in the buildings, sites, structures, urban settlements, and landscapes that reflect the complex stories of this century.

There are many opportunities for users to build on the framework and its thematic essays by drawing on regional and local historical scholarship and heritage expertise. Individual nations and localities can adapt these ten themes by developing further subthemes and identifying types of places that relate closely to their own histories. In addition to prompting new, theme-driven survey work, the framework can be applied to existing inventories to identify and fill gaps in the representation of twentieth-century places. It can also serve as a tool for community engagement. Beyond local and national applications, this framework can also be used to identify gaps in the World Heritage List and tentative lists by focusing on specific themes for which there are few or no related World Heritage Sites.

The Twentieth-Century Historic Thematic Framework is intended to prompt further research, to broaden the scope of heritage surveys, to provide a context for informed assessments, and to expand heritage protection wherever it is used. Its aim is to be a catalyst for action in holistically identifying and conserving the heritage of the twentieth century.

Authorship and Acknowledgments

The writing and production of the Twentieth-Century Historic Thematic Framework took place over a number of years and involved a large team. The idea originated with the ICOMOS ISC20C (the International Scientific Committee on Twentieth Century Heritage) in 2009 and was advanced at an experts' meeting convened by the Getty Conservation Institute in Los Angeles in 2011. We are grateful to the members of ISC20C and to the participants in this meeting for demonstrating the need for such a framework and identifying the preliminary themes.

Susan Marsden and Peter Spearritt helped develop the ten themes and were the primary authors of the first nine thematic essays; both contributed to writing and revising the report as a whole. Leo Schmidt authored the tenth essay. We are grateful for their contributions to this endeavor. The framework was expanded and revised by a team of GCI specialists led by Buildings and Sites department head Susan Macdonald and including Gail Ostergren, Jeff Cody, and Chandler McCoy, all of whom contributed to writing and editing this document. Heritage consultant Sheridan Burke was part of the GCI team from the beginning, contributing to the writing and offering guidance, review, and direction.

Thanks go to Julian Holder and Leo Schmidt, who served as expert advisers to the project. In the early stages, we were also guided by a project reference group (PRG) of experts from many countries around the world. The PRG participated in the consultant selection process, reviewed the proposed themes, and commented on the first drafts of the thematic essays. For their efforts, the GCI wishes to express appreciation to the members of the PRG: Joe Osae-Addo, ArchiAfrika Foundation; Susan Algie, Winnipeg Architecture Foundation; George Arbid, Arab Center for Architecture; Enrique de Anda Alanis, Docomomo Mexico and ISC20C; Sheridan Burke, ISC20C; Maristella Casciato, Getty Research Institute; Stephen Hughes, the International Committee for the Conservation of the Industrial Heritage (TICCIH); Marieke Kuipers, Docomomo Netherlands; and Rui Leão, Docomomo Macau.

A debt of gratitude is also owed to GCI staff members Cynthia Godlewski, for her guidance and advice; Chelsea Bingham, for support in organizing images and captions; Anna Duer, for managing the bibliographic references; and Candace Wai and former GCI staffer Sara Galerne, for assistance with meetings and administrative matters. We also wish to thank former GCI graduate intern Kristen Munchheimer for her efforts in gathering images and drafting captions. Finally, we wish to thank Dianne Woo for copyediting services, and Marci Boudreau and Vesna Petrović from Picnic Design for their graphic layout of the document.

Appendix: Background to the Thematic Framework

The Twentieth-Century Historic Thematic Framework project began in 2009 as an idea formulated by the ICOMOS ISC20C (the International Scientific Committee on Twentieth Century Heritage). The project was launched in response to the increasing numbers of modern heritage sites being nominated for World Heritage listing without a strong historical context to demonstrate their outstanding value. ICOMOS, as an advisory body to UNESCO on the World Heritage Convention, saw the need for more effective comparative assessments as the number of modern-era nominations increased. ICOMOS believed it important to look beyond the great works of architecture and consider the global historical context in which places were created.[1]

Between 2001 and 2005, the ISC20C collaborated with UNESCO and Docomomo International in a series of regional meetings on modern heritage held in Monterrey, Mexico; Chandigarh, India; Asmara, Ethiopia; Miami, Florida; and Alexandria, Egypt. At each meeting, participants concluded that there was a need to identify a broader range of significant twentieth-century places by reaching beyond the typically architecturally focused studies and lists. A number of research projects focusing on buildings by great architects and the iconic places that are increasingly recognized as modern monuments and sites were already underway, notably those being undertaken by Docomomo. During this same period, the International Committee for the Conservation of Industrial Heritage (TICCIH) also began to prepare typological thematic studies, which often included sites from the twentieth century.[2]

Beginning in 2008, the ISC20C sought to advance this project by organizing a series of international workshops. The basic concept that evolved from these workshops was the creation of a thematic framework for the twentieth century to help researchers identify potential heritage places and sites and provide a context for comparative analysis to help determine their relative significance.

The ISC20C began collaborating with the Getty Conservation Institute, which convened an international experts' meeting in Los Angeles in May 2011. Heritage professionals and representatives came together from key organizations involved in the identification and conservation of twentieth-century heritage places. Collectively, the participants had extensive experience using thematic frameworks for heritage assessment, as well as expertise with a range of twentieth-century heritage types across a wide geographic area. At the meeting, the participants—architects, landscape specialists, engineers, planners, and historians among them—closely examined the Canadian thematic framework, which identified a series of phenomena or drivers that represent the essence of the twentieth century in Canada.[3] The Australian and US thematic frameworks and the National Historic Landmarks (NHLs) theme studies were also reviewed.[4]

The experts confirmed that a thematic framework for the twentieth century was needed, and that it must be supported with adequate funding and institutional support. A preliminary list of themes was developed for the framework and a number of sites identified that exemplified those themes.[5] In 2014–15, the GCI's Conserving Modern Architecture Initiative committed to the funding and management of this project.

The GCI began by retaining the services of Sheridan Burke, who was president of the ISC20C at the time, as a consultant. Next, a project reference group (PRG) was established to advise on the project. The PRG included representatives from TICCIH, Docomomo International, the ISC20C, and other areas of the conservation and architectural history fields in many regions

around the world. In mid-2016, the PRG assisted in the finalization of a consultant's brief and request for proposals that sought potential authors to take the lead in writing the thematic framework.

Four international consultant teams submitted proposals in response. After an interview process and thorough evaluation, the GCI, in consultation with the PRG, selected the Australian team consisting of historians Peter Spearritt and Susan Marsden as primary authors. The GCI also contracted with architectural historians Leo Schmidt and Julian Holder to serve as expert advisers.

At a workshop held in 2017, drawing on the results of the 2011 experts' meeting and the recommendations of the PRG, the authors, GCI staff, and Sheridan Burke worked collectively to define the ten themes that would serve as the organizing structure for the framework. They also identified a number of subthemes that expanded on the overarching themes and prepared a list of building, site, structure, urban settlement, and landscape typologies that exemplify the themes and subthemes. This work served as the foundation for the Twentieth-Century Historic Thematic Framework, which was drafted and refined through an extensive process of writing, review, and revision.

NOTES

1. Jukka Jokilehto et al., *The World Heritage List: Filling the Gaps—An Action Plan for the Future*. Monuments and Sites 12 (Paris: ICOMOS, 2005), https://www.icomos.org/en/about-icomos/image-menu-about-icomos/116-english-categories/resources/publications/258-monumentsasites-xii.
2. For TICCIH's thematic studies on industrial heritage, see https://ticcih.org/ticcih-thematic-studies-and-published-reports/.
3. Parks Canada, "Thematic Framework," in idem, *National Historic Sites of Canada: System Plan* ([Gatineau, Quebec]: Parks Canada, 2000), 9–26, https://travelsdocbox.com/Canada/74628957-National-historic-sites-of-canada.html.
4. Australian Heritage Commission, *Australian Historic Themes: A Framework for Use in Heritage Assessment and Management* (Canberra: Australian Heritage Commission); and National Park Service, *Revision of the National Park Service's Thematic Framework* (Washington, DC: National Park Service, 1994). For the NHL theme studies, see https://www.nps.gov/subjects/nationalhistoriclandmarks/theme-studies.htm.
5. Susan Macdonald and Gail Ostergren, "Appendix C: Summary Document: A Draft Framework for Understanding the Significance of Twentieth-Century Heritage," in idem, *Developing an Historic Thematic Framework to Assess the Significance of Twentieth-Century Cultural Heritage: An Initiative of the ICOMOS International Scientific Committee on Twentieth-Century Heritage* (Los Angeles: Getty Conservation Institute, 2011), 13–15.

Bibliography

Abid, Ayesha. "Sears Is Fading, but Memories of Its Mail-Order Homes Endure." National Public Radio, October 20, 2018. https://www.npr.org/2018/10/20/657770791/sears-is-fading-but-memories-of-its-mail-order-homes-endure.

Airports Council International. "Passenger Traffic 2000 FINAL." Last modified November 1, 2001. https://aci.aero/data-centre/annual-traffic-data/passengers/2000-final-summary/.

Aldrich, Robert. *Greater France: A History of French Overseas Expansion*. European Studies Series. Basingstoke, UK: Macmillan, 1996.

Almandoz Marte, Arturo. "Latin America's Urbanization in the 20th Century." Oxford Bibliographies. Last modified May 24, 2017. https://doi.org/10.1093/obo/9780199766581-0187.

Alonso I. Terme, Rosa. *The Elimination of Primary Education Contributions for the Poor in Vietnam—A Case Study in the Political Economy of Pro-Poor Policies*. White Paper. Washington, DC: World Bank, 2003. https://www.semanticscholar.org/paper/The-Elimination-of-Primary-Education-Contributions-Terme/e21cb02e3a6f2aff8620cd345d35556154548a16.

American Egg Board. "History of Commercial Egg Production." Accessed March 2, 2020. https://www.aeb.org/farmers-and-marketers/history-of-egg-production.

Armitage, David. "The Declaration of Independence: The Words Heard around the World." *Wall Street Journal*, July 3, 2014. https://www.wsj.com/articles/the-declaration-of-independence-the-words-heard-around-the-world-1404415089.

Arrighi, Giovanni. *The Long Twentieth Century: Money, Power, and the Origins of Our Times*. 2nd ed. London: Verso, 2010.

"Asian Miracle/Tigers." In *Dictionary of Human Geography*, edited by Derek Gregory, Ron Johnston, Geraldine Pratt, Michael J. Watts, and Sarah Whatmore, 5th ed., 38. Malden, MA: Blackwell, 2009.

Auschwitz-Birkenau Memorial and Museum. "History of the Memorial." Accessed September 9, 2019. http://www.auschwitz.org/en/museum/history-of-the-memorial/.

Australian Heritage Commission. *Australian Historic Themes: A Framework for Use in Heritage Assessment and Management*. Canberra: Australian Heritage Commission, 2001.

Baker, David Mc.A. "The Cruise Industry: Past, Present and Future." *Journal of Tourism Research* 14 (October 2016): 141–53. http://www.jotr.eu/pdf_files/V14.pdf#page=143.

Baker, Lindsay. *A History of School Design and Its Indoor Environmental Standards, 1900 to Today*. Washington, DC: National Clearinghouse for Educational Facilities, 2012. http://www.ncef.org/pubs/greenschoolshistory.pdf.

Bale, J. R. "Towards a Definition of the Industrial Estate: A Note on a Neglected Aspect of Urban Geography." *Geography* 59, no. 1 (January 1974): 31–34.

Bardou, Jean Pierre, Jean-Jacques Chanaron, Patrick Fridenson, and James M. Laux. *The Automobile Revolution: The Impact of an Industry*. Chapel Hill: University of North Carolina Press, 1982.

Bayly, C. A. *Remaking the Modern World, 1900–2015: Global Connections and Comparisons*. Hoboken, NJ: John Wiley & Sons, 2018.

BBC News. "Timeline: Nuclear Plant Accidents." September 12, 2011. https://www.bbc.com/news/world-13047267.

Beanland, Christopher. *Concrete Concept: Brutalist Buildings around the World*. 1st Frances Lincoln ed. London: Frances Lincoln, 2016.

Belanger, Yale. "First Nations Gaming in Canada: Gauging Past and Ongoing Development." *Journal of Law and Social Policy* 30 (2018): 175–84. https://digitalcommons.osgoode.yorku.ca/jlsp/vol30/iss1/9/.

Bernard, Jerome. "Church and State Disagree over Management of Religious Heritage in France." *The Art Newspaper*, April 16, 2019. https://www.theartnewspaper.com/analysis/church-and-state-disagree-over-management-of-religious-heritage-in-france.

Bertaud, Alain, and Bertrand Renaud. "Socialist Cities without Land Markets." *Journal of Urban Economics* 41, no. 1 (January 1997): 137–51.

Biofuel.org.uk. "History of Biofuels." Accessed March 2, 2020. http://biofuel.org.uk/history-of-biofuels.html.

———. "South America." Accessed March 2, 2020. http://biofuel.org.uk/south-america.html.

Blue Shield International. "About Us: History." Accessed March 18, 2020. https://theblueshield.org/about-us/history/.

Bobinski, George S. *Libraries and Librarianship: Sixty Years of Challenge and Change, 1945–2005*. Lanham, MD: Scarecrow Press, 2007.

Boddy-Evans, Alistair. "Chronological List of African Independence." ThoughtCo. Last modified January 25, 2020. https://www.thoughtco.com/chronological-list-of-african-independence-4070467.

Bourdon, Jérôme. "Is Television a Global Medium? A Historical View." In *Global Currents: Media and Technology Now*, edited by Tasha G. Oren and Patrice Petro, 93–112. New Directions in International Studies. New Brunswick, NJ: Rutgers University Press, 2004.

Bradley, A., V. Buchli, G. Fairclough, D. Hicks, J. Miller, and J. Schofield. *Change and Creation: Historic Landscape Character 1950–2000*. London: English Heritage, 2004. https://historicengland.org.uk/images-books/publications/change-and-creation-historic-landscape-character/.

Brandt, E. N. *Growth Company: Dow Chemical's First Century*. East Lansing: Michigan State University Press, 1997.

Brandt, Loren, Debin Ma, and Thomas Rawski. *Industrialization in China*. IZA Discussion Papers Series no. 10096. Bonn: IZA Institute of Labor Economics, 2016. https://www.iza.org/publications/dp/10096/industrialization-in-china.

Brasor, Philip, and Masako Tsubuku. "How the Shinkansen Bullet Train Made Tokyo into the Monster It Is Today." *The Guardian*, September 30, 2014. https://www.theguardian.com/cities/2014/sep/30/-sp-shinkansen-bullet-train-tokyo-rail-japan-50-years.

Breen, Ann, and Dick Rigby. *The New Waterfront: A Worldwide Urban Success Story*. London: Thames and Hudson, 1996.

"Brief Overview of National Parks of Japan." Encyclopedia Japan. Accessed September 2019. http://doyouknowjapan.com/nationalpark/.

Brittain, Victoria. "The 20th Century: Africa." *The Guardian*, January 2, 1999. https://www.theguardian.com/world/1999/jan/02/uganda.westafrica.

Browne, O'Brien. "Creating Chaos: Lawrence of Arabia and the 1916 Arab Revolt." HistoryNet. Accessed March 18, 2020. https://www.historynet.com/creating-chaos-lawrence-of-arabia-and-the-1916-arab-revolt.htm.

Bruegmann, Robert. *Sprawl: A Compact History*. Chicago: University of Chicago Press, 2005.

Bryant, Nick. "How Penn Station Saved New York's Architectural History." *BBC News*, May 28, 2015. https://www.bbc.com/news/magazine-32890011.

Bureau International des Expositions. "Expo 1915 San Francisco." Accessed March 4, 2020. https://www.bie-paris.org/site/en/1915-san-francisco.

———. "Expo 1929 Barcelona." Accessed March 4, 2020. https://www.bie-paris.org/site/en/1929-barcelona.

———. "Expo 1970 Osaka." Accessed January 28, 2020. https://www.bie-paris.org/site/en/1970-osaka.

Burns, R. W. *Television: An International History of the Formative Years*. IEE History of Technology Series 22. London: Institution of Electrical Engineers, 1998.

Carnegie Foundation Peace Palace. "History." Accessed March 18, 2020. https://www.vredespaleis.nl/peace-palace/history/?lang=en.

Centers for Disease Control and Prevention. "1918 Pandemic (H1N1 virus)." Last modified March 20, 2019. https://www.cdc.gov/flu/pandemic-resources/1918-pandemic-h1n1.html.

Čepaitienė, Rasa. "In the Shadow of Moscow: The Stalinist Reconstruction of the Capitals of the Soviet Republics." *Journal of Architecture and Urbanism* 39, no. 1 (2015): 3–16.

Chadwick, Peter. *This Brutal World*. London: Phaidon, 2016.

Chalkley, Brian, and Stephen Essex. "Urban Development through Hosting International Events: A History of the Olympic Games." *Planning Perspectives* 14, no. 4 (1999): 369–94.

Chandler, Alfred D., Jr., ed. *Giant Enterprise: Ford, General Motors, and the Automobile Industry*. New York: Harcourt, Brace & World, 1964.

Chandler, Arthur. "Empire of the Republic: The *Exposition Coloniale Internationale de Paris*, 1931." Expanded and revised from *World's Fair* 8, no. 4 (1988) and *Contemporary French Civilization* (Winter/Spring 1990). ArthurChandler.com. Accessed March 4, 2020. http://www.arthurchandler.com/paris-1931-exposition/.

Châtelet, Anne-Marie. "A Breath of Fresh Air: Open-Air Schools in Europe." In *Designing Modern Childhoods: History, Space, and the Material Culture of Children*, edited by Marta Gutman and Ning de Coninck-Smith, 107–27. Rutgers Series in Childhood Studies. New Brunswick, NJ: Rutgers University Press, 2008.

Christ-Janer, Albert, and Mary Mix Foley. *Modern Church Architecture: A Guide to the Form and Spirit of 20th Century Religious Buildings*. New York: Dodge Book Dept., McGraw-Hill, 1962.

Classora. "Ranking of the World's Richest Countries by GDP (1974)." Last modified April 12, 2016. http://en.classora.com/reports/t24369/general/ranking-of-the-worlds-richest-countries-by-gdp?edition=1974&fields.

CN Tower. "Astounding: Celebrating the History of Canada's Architectural, Engineering and Construction Wonder." Accessed March 4, 2020. https://www.cntower.ca/en-ca/about-us/history/astounding.html.

Commonwealth War Graves Commission. Official website. Accessed October 15, 2019. https://www.cwgc.org/.

Constable, George, and Bob Somerville. "Agricultural Mechanization." *In A Century of Innovation: Twenty Engineering Achievements That Transformed Our Lives*, 73–80. Washington, DC: Joseph Henry Press, 2003.

Cooke, Philip, ed. *The Rise of the Rustbelt*. London: UCL Press, 1995.

Cortez, Luís A. B., Luiz A. H. Nogueira, Manoel R. V. L. Leal, and Ricardo Baldassin Jr. "40 Years of the Brazilian Ethanol Program (Proálcool): Relevant Public Policies and Events throughout Its Trajectory and Future Perspectives." Paper presented at the 22nd International Symposium on Alcohol Fuels, Cartagena, Colombia, March 2016. http://bioenfapesp.org/gsb/lacaf/documents/papers/05_ISAF_2016_Cortez_et_al.pdf.

Cox, Wendell. "Dispersion in Europe's Cities." *NewGeography* (blog). April 17, 2015. http://www.newgeography.com/content/004901-dispersion-europes-cities.

Cudahy, Brian J. "The Containership Revolution: Malcom McLean's 1956 Innovation Goes Global." *TR News*, no. 246 (September–October 2006): 5–9. http://www.trb.org/Publications/Blurbs/158043.aspx.

Danilov, Viktor. "The Issue of Alternatives and History of the Collectivization of Soviet Agriculture." *Journal of Historical Sociology* 2, no. 1 (March 1989): 1–13.

Dark-Tourism.com. Official website. Accessed October 15, 2019. http://www.dark-tourism.com.

Davidson, Jim, and Peter Spearritt. "Mobility and Its Consequences." In *Holiday Business: Tourism in Australia since 1870*, 154–86. Melbourne: Melbourne University Press, 2000.

Dewey, P. E. *British Agriculture in the First World War*. London: Routledge, 1989.

Docomomo International. "New Campaign to Protect Aichi Prefectural University of Fine Arts." Last modified September 16, 2011. https://www.docomomo.com/2011/09/16/aichi-prefectural-university-of-fine-arts-and-music/.

Doyle, Jack. *Trespass against Us: Dow Chemical and the Toxic Century*. Monroe, ME: Common Courage Press, 2004.

Düwel, Jörn, and Niels Gutschow. *A Blessing in Disguise: War and Town Planning in Europe, 1940–1945*. Berlin: DOM Publishers, 2013.

Earth Day Network. "The History of Earth Day." Accessed January 2019. https://www.earthday.org/about/the-history-of-earth-day/.

Ellis-Petersen, Hannah. "'Bhopal's Tragedy Has Not Stopped': The Urban Disaster Still Claiming Lives 35 Years On." *The Guardian*, December 8, 2019. https://www.theguardian.com/cities/2019/dec/08/bhopals-tragedy-has-not-stopped-the-urban-disaster-still-claiming-lives-35-years-on.

Engineering and Technology History Wiki. "Milestones: Development of VHS, a World Standard for Home Video Recording, 1976." Last modified December 31, 2015. https://ethw.org/Milestones:Development_of_VHS,_a_World_Standard_for_Home_Video_Recording,_1976.

Ericson, Steven J. "The Industrial Revolution in the Twentieth Century, with a Focus on Japan and the East Asian Followers." *OAH Magazine of History* 15, no. 1 (Fall 2000): 24–29.

Everts, Sarah. "A Brief History of Chemical War." *Distillations* (blog). Science History Institute. May 11, 2015. https://www.sciencehistory.org/distillations/magazine/a-brief-history-of-chemical-war/.

Fan, K. Sizheng. "A Classicist Architecture for Utopia: The Soviet Contacts." In *Chinese Architecture and the Beaux-Arts*, edited by Jeffrey W. Cody, Nancy S. Steinhardt, and Tony Atkin, 91–126. Honolulu: University of Hawai'i Press, 2011.

Farmer, Liz. "3 Cities That Used Natural Disasters to Revitalize Their Futures." *Governing: The Future of States and Localities* (blog). August 2013. https://www.governing.com/topics/transportation-infrastructure/gov-cities-that-used-disasters-to-revitalize-their-futures.html.

Farole, Thomas, and Gokhan Akinci, eds. *Special Economic Zones: Progress, Emerging Challenges, and Future Directions*. Directions in Development: Trade. Washington, DC: World Bank, 2011. http://hdl.handle.net/10986/2341.

Ferrer, Albert. "Steiner and Montessori: Integral Education within a Spiritual World View." *International Journal of Education and Psychological Research* 7, no. 1 (2018): 1–8. http://ijepr.org/paper.php?id=415.

First International Congress of Architects and Technicians of Historic Monuments. The Athens Charter for the Restoration of Historic Monuments. 1931. https://www.icomos.org/en/charters-and-texts/179-articles-en-francais/ressources/charters-and-standards/167-the-athens-charter-for-the-restoration-of-historic-monuments.

Food and Agriculture Organization of the United Nations (FAO). *The State of Food and Agriculture 2000: Lessons from the Past 50 Years*. FAO Agriculture Series, no. 32. Rome: FAO, 2000. http://www.fao.org/3/x4400e/x4400e.pdf.

Fortune Global 500. "Global 500 2000." Accessed August 23, 2019. https://fortune.com/global500/2000/.

Foster, S. G., Susan Marsden, and Roslyn Russell. *Federation: The Guide to Records*. Canberra: Australian Archives, 1998.

Fowler, P. J. *World Heritage Cultural Landscapes: 1992–2002*. World Heritage Papers 6. Paris: UNESCO World Heritage Centre, 2003. https://unesdoc.unesco.org/ark:/48223/pf0000133121.locale=en.

Fox, Sean. "Urbanization as a Global Historical Process: Theory and Evidence from sub-Saharan Africa." *Population and Development Review* 38, no. 2 (June 2012): 285–310.

Franke, Paul. *Of the Rat Pack, Ashtrays, Cocktail Napkins, and Grateful Losers: The Making of the Las Vegas Experience as a Historical Process in the 20th Century*. UNLV Center for Gaming Research Occasional Paper Series no. 39. Las Vegas: Center for Gaming Research, UNLV University Libraries, 2017. https://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=1045&context=occ_papers.

Freinkel, Susan. "A Brief History of Plastic's Conquest of the World." *Scientific American*, May 29, 2011. https://www.scientificamerican.com/article/a-brief-history-of-plastic-world-conquest/.

———. *Plastic: A Toxic Love Story*. Boston: Houghton Mifflin Harcourt, 2011.

Gertner, Jon. *The Idea Factory: Bell Labs and the Great Age of American Innovation*. New York: Penguin, 2012.

Geva, Anat. "Introduction: Sacred Space." In *Modernism and American Mid-20th Century Sacred Architecture*, edited by Anat Geva. Abingdon, UK: Routledge, 2019.

Glendinning, Miles. *The Conservation Movement: A History of Architectural Preservation: Antiquity to Modernity*. Abingdon, UK: Routledge, 2013.

Gordon, Alastair. *Naked Airport: A Cultural History of the World's Most Revolutionary Structure*. Chicago: University of Chicago Press, 2008.

Gordon, David L. A. "Capital Cities in the Twentieth Century." In *Planning Twentieth Century Capital Cities*, edited by David L. A. Gordon. Planning, History, and Environment Series, 1–7. London: Routledge, 2006.

Hacker, Barton C., and Margaret Vining. "Military Museums and Social History." In *Does War Belong in Museums? The Representation of Violence in Exhibitions*, edited by Wolfgang Muchitsch. Edition Museumsakademie Joanneum 4, 41–59. Bielefeld: transcript Verlag, 2013. https://www.transcript-verlag.de/978-3-8394-2306-6.

Hanania, Jordan, James Jenden, Kailyn Stenhouse, and Jason Donev. "Coal Fired Power Plant." Energy Education, University of Calgary. Last modified February 24, 2019. https://energyeducation.ca/encyclopedia/Coal_fired_power_plant.

Harford, Tim. "How Rudolf Diesel's Engine Changed the World." *BBC News*, December 19, 2016. https://www.bbc.com/news/business-38302874.

Haverkamp, Jan. "'...People Have Become a Sort of Radioactive Waste.'" *Nuclear Reaction* (blog). Greenpeace International. September 29, 2017. https://www.greenpeace.org/archive-international/en/news/Blogs/nuclear-reaction/Mayak-anniversary-radioactive-waste-rosatom/blog/60344/.

Havers, H. C. P. *Underground Railways of the World: Their History and Development*. London: Temple Press Books, 1966.

Hawkins, Bob, Gabriele Lechner, and Paul Smith, eds. *Historic Airports: Proceedings of the International l'Europe de l'Air Conferences on Aviation Architecture: Liverpool (1999), Berlin (2000), Paris (2001)*. London: English Heritage, 2005.

Hays, Jeffrey. "Trains in China: History, Train Life, New Lines and Great Leap Culture." Facts and Details. Last modified April 2012. http://factsanddetails.com/china/cat13/sub86/item315.html.

Hein, Carola, ed. *Port Cities: Dynamic Landscapes and Global Networks*. Abingdon, UK: Routledge, 2011.

Heppner, Ernest G. *Shanghai Refuge: A Memoir of the World War II Jewish Ghetto*. Lincoln: University of Nebraska Press, 1993.

Heritage Alliance. *Survey of Post-War Built Heritage in Victoria: Stage One*. Vol. 1, *Contextual Overview, Methodology, Lists & Appendices*. North Melbourne: Heritage Alliance; [Melbourne]: Heritage Victoria, 2008. https://www.heritage.vic.gov.au/research-and-publications/thematic-and-typological-studies/survey-of-post-war-built-heritage-in-victoria-stage-one.

Herron, Alec. "Manchester's Trafford Park, the World's First Industrial Estate—A History of Cities in 50 Buildings, Day 26." *The Guardian*, April 29, 2015. https://www.theguardian.com/cities/2015/apr/29/manchester-trafford-park-world-first-industrial-estate-history-cities-50-buildings.

Hobsbawm, Eric. "War and Peace in the 20th Century." *London Review of Books* 24, no. 4 (February 21, 2002): 16–18. https://www.lrb.co.uk/v24/n04/eric-hobsbawm/war-and-peace-in-the-20th-century.

Horne, Donald, Susan Marsden, and Alison Painter, comps. *A Hidden Australian Cultural Resource: The Parallel Education System*. Melbourne: Monash University, 1993.

"Hydroponics." In *The Gale Encyclopedia of Science*, edited by K. Lee Lerner and Brenda Wilmoth Lerner, vol. 4, 5th ed., 2271–72. Farmington Hills, MI: Gale, 2014.

International Atomic Energy Agency. "IAEA Releases Nuclear Power Statistics for 2000." News release, May 3, 2001. https://www.iaea.org/newscenter/pressreleases/iaea-releases-nuclear-power-statistics-2000.

International Council on Archives. "Blue Shield." Accessed March 18, 2020. https://www.ica.org/en/networking/blue-shield.

International Criminal Court. "About: History." Accessed March 18, 2020. https://www.icc-cpi.int/about.

International Energy Agency. "Coal." IEA Atlas of Energy. Accessed March 3, 2020. http://energyatlas.iea.org/#!/tellmap/2020991907/1.

———. *World Energy Outlook 2000*. Paris: Organization for Economic Cooperation and Development and International Energy Agency, 2001. https://doi.org/10.1787/weo-2000-en.

———. *World Energy Outlook 2006*. Paris: International Energy Agency and Organization for Economic Cooperation and Development, 2006. https://doi.org/10.1787/weo-2006-en.

International Federation of Red Cross and Red Crescent Societies. "History." Accessed March 18, 2020. https://www.ifrc.org/en/who-we-are/history/.

International Labour Organization. "History of the ILO." Accessed March 18, 2020. https://www.ilo.org/global/about-the-ilo/history/lang--en/index.htm.

International Union for Conservation of Nature. "About." Accessed January 2019. https://www.iucn.org/about.

Iweriebor, Ehiedu E. G. "The Colonization of Africa." Africana Age: African and African Diasporan Transformations in the 20th Century. Schomburg Center for Research in Black Culture, New York Public Library. Accessed August 6, 2020. https://wayback.archive-it.org/11788/20200109141010/http://exhibitions.nypl.org/africanaage/essay-colonization-of-africa.html.

Jackson, Kenneth T. *Crabgrass Frontier: The Suburbanization of the United States*. New York: Oxford University Press, 1985.

Johnson, Todd M., and Brian J. Grim. "Table 1.2: Percentage of the World's Population Belonging to No Religion or Religion, 1910–2010." In idem, *The World's Religions in Figures: An Introduction to International Religious Demography*. Chichester, UK: Wiley-Blackwell, 2013.

Jokilehto, Jukka, Henry Cleere, Susan Denyer, and Michael Petzet. *The World Heritage List: Filling the Gaps—An Action Plan for the Future*. Monuments and Sites 12. Paris: ICOMOS, 2005. https://www.icomos.org/en/about-icomos/image-menu-about-icomos/116-english-categories/resources/publications/258-monumentsasites-xii.

Karlen, Douglas L., and Charles W. Rice. "Soil Degradation: Will Humankind Ever Learn?" *Sustainability* 7, no. 9 (2015): 12490–501. https://doi.org/10.3390/su70912490.

Kaser, David. "Library Buildings." In *World Encyclopedia of Library and Information Services*, edited by Robert Wedgeworth, 3rd ed., 479–80. Chicago: American Library Association, 1993.

Kelly, Catriona. "The Shock of the Old: Architectural Preservation in Soviet Russia." *Nations and Nationalism* 24, no. 1 (2018): 88–109.

Kennan, George F. *The Decline of Bismarck's European Order: Franco-Russian Relations, 1875–1890*. Princeton, NJ: Princeton University Press, 1979.

Kirk, Dudley, and Earl Huyck. "Overseas Migration from Europe since World War II." *American Sociological Review* 19, no. 4 (August 1954): 447–56.

Klemek, Christopher. *The Transatlantic Collapse of Urban Renewal: Postwar Urbanism from New York to Berlin*. Historical Studies of Urban America. Chicago: University of Chicago Press, 2011.

Koza, Patricia. "O'Hare Still World's Busiest Airport." *UPI*, April 24, 1981. https://upi.com/6014294.

Kuepper, George. *A Brief Overview of the History and Philosophy of Organic Agriculture*. Poteau, OK: Kerr Center for Sustainable Agriculture, 2010. https://kerrcenter.com/publication/brief-overview-history-philosophy-organic-agriculture/.

Kunkel, Patrick. "Spotlight: Geoffrey Bawa." *ArchDaily* (blog). July 23, 2019. https://www.archdaily.com/770481/spotlight-geoffrey-bawa.

Lambert, Robin. "The Bath Corporation Act of 1925." *Transactions of the Ancient Monuments Society* 44 (2000): 51–62.

Landesberg, Richard, and Mark J. Pescatore. "Television Broadcasting, History of." In *Encyclopedia of Communication and Information*, edited by Jorge Reina Schement, vol. 3, 1024–28. New York: Macmillan Reference USA, 2002. Accessible on Encyclopedia.com, last modified November 26, 2019, https://www.encyclopedia.com/media/encyclopedias-almanacs-transcripts-and-maps/television-broadcasting-history.

Leeuwen, Bas van, and Jieli van Leeuwen-Li. "Education since 1820." In *How Was Life? Global Well-Being since 1820*, edited by Jan Luiten van Zanden, Joerg Baten, Marco Mira d'Ercole, Auke Rijpma, Conal Smith, and Marcel Timmer, 87–102. Paris: OECD, 2014. https://doi.org/10.1787/9789264214262-en.

Leiner, Barry M., Vinton G. Cerf, David D. Clark, Robert E. Kahn, Leonard Kleinrock, Daniel C. Lynch, Jon Postel, Larry G. Roberts, and Stephen Wolff. *Brief History of the Internet*. Reston, VA: Internet Society, 1999. https://www.internetsociety.org/internet/history-internet/brief-history-internet/.

Lennon, John, and Malcolm Foley. *Dark Tourism: The Attraction of Death and Disaster*. London: Continuum, 2000.

Levinson, Marc. *The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger*. Princeton, NJ: Princeton University Press, 2006.

———. "Container Shipping and the Economy: Stimulating Trade and Transformations Worldwide." *TR News*, no. 246 (September–October 2006): 10–12. http://www.trb.org/Publications/Blurbs/158043.aspx.

Licklider, J. C. R. *Libraries of the Future*. Cambridge, MA: MIT Press, 1965.

Lü, Junhua, Peter G. Rowe, and Zhang Jie, eds. *Modern Urban Housing in China, 1840–2000*. Munich: Prestel, 2001.

Macdonald, Susan, and Gail Ostergren. "Appendix C: Summary Document: A Draft Framework for Understanding the Significance of Twentieth-Century Heritage." In idem, *Developing an Historic Thematic Framework to Assess the Significance of Twentieth-Century Cultural Heritage: An Initiative of the ICOMOS International Scientific Committee on Twentieth-Century Heritage*, 13–15. Los Angeles: Getty Conservation Institute, 2011.

MacMillan, Margaret. *Paris 1919: Six Months That Changed the World*. 1st US ed. New York: Random House, 2002.

MacWilliams, Bryon. "Turkey's Old-Fashioned Distance Education Draws the Largest Student Body on Earth." *Chronicle of Higher Education* 47, no. 4 (September 22, 2000): A41–A42.

Maddison, Angus. *Monitoring the World Economy, 1820–1992*. Development Center Studies. Paris: Organization for Economic Cooperation and Development, 1995.

Maehlum, Mathias Aarre. "Where Is Solar Power Used the Most?" Energy Informative (web page). Last modified June 4, 2014. https://web.archive.org/web/20181031192908/http://energyinformative.org/where-is-solar-power-used-the-most/.

Mandavilli, Apoorva. "The World's Worst Industrial Disaster Is Still Unfolding." *The Atlantic*, July 10, 2018. https://www.theatlantic.com/science/archive/2018/07/the-worlds-worst-industrial-disaster-is-still-unfolding/560726/.

The Map as History. "Decolonization after 1945." Accessed January 24, 2020. https://www.the-map-as-history.com/Decolonization-after-1945.

Mariani, Daniele. "Prepared for Anything: Bunkers for All." SWI swissinfo.ch. July 3, 2009. https://www.swissinfo.ch/eng/prepared-for-anything_bunkers-for-all/995134.

Marshall, Stephen. "Mass Transit." In *Encyclopedia of the City*, edited by Roger W. Caves, 305–7. Abingdon, UK: Routledge, 2005.

Matthews, G. V. T. *The Ramsar Convention on Wetlands: Its History and Development*. Gland, Switzerland: Ramsar Convention Bureau, 1993, 2013. Citations refer to the 2013 edition. https://www.ramsar.org/sites/default/files/documents/pdf/lib/Matthews-history.pdf.

McCarter, Robert. *Aldo van Eyck*. New Haven, CT: Yale University Press, 2015.

McClellan, G. H., and S. J. Van Kauwenbergh. "World Phosphate Rock Production." In *Use of Phosphate Rocks for Sustainable Agriculture*, edited by F. Zapata and R. N. Roy. FAO Fertilizer and Plant Nutrition Bulletin 13, 11. Rome: Food and Agriculture Organization of the United Nations, 2004. http://www.fao.org/3/y5053e/y5053e07.htm#bm07.1.

McClure, Margaret. *The Wonder Country: Making New Zealand Tourism*. Auckland: Auckland University Press, 2004.

McFadden, Christopher. "A Brief History of the Telescope: From 1608 to Gamma-Rays." *Interesting Engineering* (blog). May 27, 2018. https://interestingengineering.com/a-brief-history-of-the-telescope-from-1608-to-gamma-rays.

McKibben, Bill. "The Race to Solar-Power Africa." *New Yorker*, June 19, 2017. https://www.newyorker.com/magazine/2017/06/26/the-race-to-solar-power-africa.

McNeill, J. R. *Something New under the Sun: An Environmental History of the Twentieth-Century World*. Global Century Series. New York: W. W. Norton, 2000.

Médecins Sans Frontières—Doctors Without Borders. "Founding." Accessed March 18, 2020. https://www.doctorswithoutborders.org/who-we-are/history/founding.

Melosi, Martin V. "The Automobile Shapes the City." Automobile in American Life and Society. Accessed March 4, 2020. http://www.autolife.umd.umich.edu/Environment/E_Casestudy/E_casestudy1.htm.

Merin, Gili. "AD Classics: The National Art Schools of Cuba / Ricardo Porro, Vittorio Garatti, Roberto Gottardi." *ArchDaily* (blog). September 12, 2013. https://www.archdaily.com/427268/ad-classics-the-national-art-schools-of-cuba-ricardo-porro-vittorio-garatti-robert-gattardi/.

Miers, Suzanne. *Slavery in the Twentieth Century: The Evolution of a Global Problem*. Walnut Creek, CA: AltaMira Press, 2003.

Ministry of the Environment Government of Japan. "The Origin of Shinjuku Imperial Garden." Accessed March 3, 2020. https://www.env.go.jp/garden/shinjukugyoen/english/1_intro/history.html.

Miser, Tim. "A Short History of the Evolving Uses of Natural Gas." *Power Engineering* 119, no. 2 (February 13, 2015). https://www.power-eng.com/2015/02/13/a-short-history-of-the-evolving-uses-of-natural-gas/.

Miskovic, Natasa, Harald Fischer-Tiné, and Nada Boskovska, eds. *The Non-Aligned Movement and the Cold War: Delhi, Bandung, Belgrade*. Routledge Studies in the Modern History of Asia 96. London: Routledge, 2014.

Mosse, George L. *Fallen Soldiers: Reshaping the Memory of the World Wars*. New York: Oxford University Press, 1990.

Nagpal, Himanshi. "The Historical Journey of Anti-Dowry Laws." *Feminism in India* (blog). June 21, 2017. https://feminisminindia.com/2017/06/21/historical-journey-anti-dowry-laws/.

National Academy of Sciences. "Agricultural Mechanization Timeline." Greatest Engineering Achievements of the 20th Century. Accessed March 2, 2020. http://greatachievements.org/?id=3725.

———. "High-Performance Materials History Part 1—Metals." Greatest Engineering Achievements of the 20th Century. Accessed April 24, 2019. http://www.greatachievements.org/?id=3809.

National Aeronautics and Space Administration. "July 20, 1969: One Giant Leap for Mankind." Last modified July 20, 2019. https://www.nasa.gov/mission_pages/apollo/apollo11.html.

National Indian Gaming Commission. "History." Accessed March 4, 2020. https://www.nigc.gov/commission/history.

National Park Service. *Revision of the National Park Service's Thematic Framework*. Washington, DC: National Park Service, 1994.

National Park Service, US Department of the Interior. "Quick History of the National Park Service." Last modified May 14, 2018. https://www.nps.gov/articles/quick-nps-history.htm.

NationMaster. "Media > Television receivers > Per capita: Countries Compared." Last modified May 5, 2014. https://www.nationmaster.com/country-info/stats/Media/Television-receivers/Per-capita#1997.

Nesterova, Yulia. "Indigenous Peoples and Their Rights: How They Started, Why They Matter." *Impakter* (blog). August 28, 2017. https://impakter.com/indigenous-peoples-part-one/.

Nolan, Peter. "Collectivization in China: Some Comparisons with the USSR." *Journal of Peasant Studies* 3, no. 2 (1976): 192–220.

Nove, Alec. *An Economic History of the USSR*. Pelican Books. Harmondsworth, UK: Penguin, 1969.

Nwulu, Nnamdi I., Adeyemi Adekanbi, Tochukwu Oranugo, and Yemi Adewale. "Abstract: Television Broadcasting in Africa: Pioneering Milestones." In *Proceedings of the 2010 Second Region 8 IEEE Conference on the History of Communications*, 1–6. Madrid, Spain, November 3–5, 2010. Piscataway, NJ: Institute of Electrical and Electronics Engineers, 2010.

Office of the Historian, Foreign Service Institute, US Department of State. "Decolonization of Asia and Africa, 1945–1960." Milestones in the History of U.S. Foreign Relations. Accessed March 18, 2020. https://history.state.gov/milestones/1945-1952/asia-and-africa.

Olson, James S., Robert Shadle, Ross Marlay, William G. Ratliff, and Joseph M. Rowe Jr., eds. *Historical Dictionary of European Imperialism*. New York: Greenwood Press, 1991.

OrganicNet. "The History of Organic Farming." Last modified August 30, 2016. https://www.organicnet.co/en/magazine/the-history-of-organic-farming.

Oudenampsen, Merijn. "Aldo van Eyck and the City as Playground." *MO* (blog). March 27, 2013. https://merijnoudenampsen.org/2013/03/27/aldo-van-eyck-and-the-city-as-playground/.

Overy, Richard. *Collins Atlas of 20th Century History*. London: Collins, 2005.

Pakenham, Thomas. *The Scramble for Africa, 1876–1912*. 1st US ed. New York: Random House, 1991.

Parks Canada. "Thematic Framework." In idem, *National Historic Sites of Canada: System Plan*, 9–26 ([Gatineau, Quebec]: Parks Canada, 2000). https://travelsdocbox.com/Canada/74628957-National-historic-sites-of-canada.html.

Pelkey, James. "Three Revolutions in Computer Technologies and Corporate Usage 1968–1988." Chap. 0.4 in *Entrepreneurial Capitalism and Innovation: A History of Computer Communications 1968–1988*. 2007. Accessed August 5, 2020. http://www.historyofcomputercommunications.info/Book/Introduction/0.4-ThreeRevolutionsComputerTechnologiesCorporateUsage68-88.html.

Pichtel, John. *Waste Management Practices: Municipal, Hazardous, and Industrial*. Boca Raton, FL: Taylor & Francis, 2005.

Pimentel, David, and Hugh Lehman, eds. *The Pesticide Question: Environment, Economics, and Ethics*. New York: Chapman and Hall, 1993.

Pollard, Sidney. "British and World Shipbuilding, 1890–1914: A Study in Comparative Costs." *Journal of Economic History* 17, no. 3 (September 1957): 426–44.

Pomfret, Richard. *The Age of Equality: The Twentieth Century in Economic Perspective*. Cambridge, MA: Belknap Press of Harvard University Press, 2011.

Pommer, Richard, and Christian F. Otto. *Weissenhof 1927 and the Modern Movement in Architecture*. Chicago: University of Chicago Press, 1991.

Poon, Linda. "To Bounce Back from Disaster, Balance Is Key." *CityLab*, July 21, 2017. https://www.citylab.com/environment/2017/07/bouncing-back-from-natural-disasters-is-all-about-balance/534354/.

Post, Robert C. *Urban Mass Transit: The Life Story of a Technology*. Baltimore: Johns Hopkins University Press, 2010.

Primoratz, Igor, ed. *Terror from the Sky: The Bombing of German Cities in World War II*. New York: Berghahn Books, 2010.

Prosterman, Roy L. "Land Reform." In *International Encyclopedia of the Social Sciences*, edited by William A. Darity Jr., vol. 4, 2nd ed., 341–45. Farmington Hills, MI: Macmillan Reference USA, 2008. Accessible on Encyclopedia.com, last modified February 20, 2020. https://www.encyclopedia.com/history/ancient-greece-and-rome/ancient-history-rome/agrarian-reform#3045301297.

Rabanal, Herminio R. *History of Aquaculture*. ASEAN/SF/88/Tech. 7. Manila: ASEAN/UNDP/FAO Regional Small-Scale Coastal Fisheries Development Project, 1988. http://www.fao.org/3/ag158e/AG158E01.htm#ref1.2.

Raghuram, G. "An Overview of the Trucking Sector in India: Significance and Structure." Indian Institute of Management Ahmedabad Working Papers Series 2015-12-02. Ahmedabad: Indian Institute of Management Ahmedabad, 2015. https://web.iima.ac.in/assets/snippets/workingpaperpdf/12319057932015-12-02.pdf.

Ram, Ed. "Will the UK's Gas Holders Be Missed?" *BBC News*, February 9, 2015. https://www.bbc.com/news/magazine-30405066.

Regal, Brian. *Radio: The Life Story of a Technology*. Westport, CT: Greenwood Press, 2005.

Reid, Susan E. "Introduction." In "Design, Stalin and the Thaw," edited by Susan E. Reid, special issue. *Journal of Design History* 10, no. 2 (1997): 107–18.

Republic of France. "Loi du 9 décembre 1905 concernant la séparation des Eglises et de l'Etat." Légifrance. Accessed September 19, 2019. https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=LEGITEXT000006070169&dateTexte=20160802.

Rhyne, Charles S. "The First International Document for Diverse Cultural Values in Conservation: 'The Document of Nara.'" Paper presented at the Annual Meeting of the American Institute for the Conservation of Historic and Artistic Works, St. Paul, Minnesota, June 7, 1995. https://www.reed.edu/art/rhyne/papers/first.html.

Riordan, Michael, Lillian Hoddeson, and Conyers Herring. "The Invention of the Transistor." *Reviews of Modern Physics* 71, no. 2 (1999): S336–S345.

Ritchie, Hannah, and Max Roser. "Energy." Our World in Data. Last modified July 2018. https://ourworldindata.org/energy.

———. "Share of Rural vs. Urban Population with Electricity Access, 2016." Our World in Data. Last modified November 2019. https://ourworldindata.org/grapher/share-of-rural-population-with-electricity-access-vs-share-of-total-population-with-electricity-access.

———. "Urbanization over the Past 500 Years." Our World in Data. Last modified November 2019. https://ourworldindata.org/grapher/urbanization-last-500-years.

Robin, Marie-Monique. *The World According to Monsanto: Pollution, Corruption, and the Control of the World's Food Supply*. New York: New Press, 2010.

Rodney, Walter. *How Europe Underdeveloped Africa*. Rev. ed. Baltimore: Black Classic Press, 2011.

Rogers, Rebecca, and Carol O. Perkins. "Education." In *Oxford Encyclopedia of Women in World History*, edited by Bonnie G. Smith, vol. 2, 140–57. Oxford: Oxford University Press, 2008.

Rosen, Tove, ed. "The Influence of the Nuremberg Trial on International Criminal Law." Robert H. Jackson Center. Accessed March 18, 2020. https://www.roberthjackson.org/speech-and-writing/the-influence-of-the-nuremberg-trial-on-international-criminal-law/.

Roser, Max. "Age of Democracies at the End of 2015." Our World in Data. Last modified June 2019. https://ourworldindata.org/grapher/age-of-democracies.

———. "Democracy." Our World in Data. Last modified June 2019. https://ourworldindata.org/democracy.

———. "Life Expectancy." Our World in Data. Last modified October 2019. https://ourworldindata.org/life-expectancy.

Roser, Max, and Esteban Ortiz-Ospina. "Global Education." Our World in Data. Accessed September 19, 2019. https://ourworldindata.org/global-rise-of-education.

———. "Literacy." Our World in Data. Last modified September 20, 2018. https://ourworldindata.org/literacy.

———. "Tertiary Education." Our World in Data. Accessed January 5, 2019. https://ourworldindata.org/tertiary-education.

Roser, Max, Hannah Ritchie, and Esteban Ortiz-Ospina. "World Population by Region." Our World in Data. Last modified May 2019. https://ourworldindata.org/grapher/world-population-by-world-regions-post-1820.

Rowley, Tom. "Telegram System Ends. Stop. Replaced by Text Messages. Stop." *The Telegraph*, June 14, 2013. https://www.telegraph.co.uk/technology/internet/10120701/Telegram-system-ends.-Stop.-Replaced-by-text-messages.-Stop.html.

Rowthorn, Robert, and Ramana Ramaswamy. *Deindustrialization: Its Causes and Implications*. Economic Issues 10. Washington, DC: International Monetary Fund, 1997. https://www.imf.org/EXTERNAL/PUBS/FT/ISSUES10/INDEX.HTM.

Sanders, Don, and Susan Sanders. *The American Drive-in Movie Theater*. Osceola, WI: Motorbooks International, 1997.

Satterthwaite, David. "The Scale of Urban Change Worldwide 1950–2000 and Its Underpinnings." Human Settlements Discussion Paper Series, Urban Change, no. 1. London: International Institute for Environment and Development, 2005. https://pubs.iied.org/9531IIED.

Sawe, Benjamin Elisha. "The Most Popular Sports in the World." WorldAtlas. Last modified April 5, 2018. https://www.worldatlas.com/articles/what-are-the-most-popular-sports-in-the-world.html.

Scanlon, Kathleen, Melissa Fernández Arrigoitia, and Christine Whitehead. "Social Housing in Europe." *European Policy Analysis* 17 (2015): 1–12. http://www.sieps.se/en/publications/2015/social-housing-in-europe-201517epa/.

Schaap, James I. "The Growth of the Native American Gaming Industry: What Has the Past Provided, and What Does the Future Hold?" *American Indian Quarterly* 34, no. 3 (Summer 2010): 365–89.

Schewe, Eric. "How the Brownie Camera Made Everyone a Photographer." *JSTOR Daily* (blog). December 26, 2018. https://daily.jstor.org/how-the-brownie-camera-made-everyone-a-photographer/.

Schmidt, Leo. "Back to the Future—Forward to the Past: Replacing Modernist Buildings with Reconstructions." *Historic Environment* 25, no. 1 (2013): 32–45.

Schnepf, Randy. *Agriculture-Based Biofuels: Overview and Emerging Issues*. CRS Report R41282. Washington, DC: Congressional Research Service, 2013. https://fas.org/sgp/crs/misc/R41282.pdf.

Schofer, Evan, and John W. Meyer. "The Worldwide Expansion of Higher Education in the Twentieth Century." *American Sociological Review* 70, no. 6 (December 2005): 898–920.

Seid, Michael H. "Where It All Began: The Evolution of Franchising." Franchise-Chat. Accessed May 17, 2019. http://www.franchise-chat.com/resources/where_it_all_began_the_evolution_of_franchising.htm.

SEREPSA (Secretaría Ejecutiva de la Reserva Ecológica Pedregal de San Ángel). "Portal oficial de la Reserva Ecológica Pedregal de San Ángel." Coordinación de la Investigación Científica, Universidad Nacional Autónoma de México (UNAM). Last modified September 4, 2013. http://www.repsa.unam.mx/.

Sezgin, Erkan, and Medet Yolal. "Golden Age of Mass Tourism: Its History and Development." In *Visions for Global Tourism Industry: Creating and Sustaining Competitive Strategies*, edited by Murat Kasimoglu, 73–90. London: IntechOpen, 2012. https://doi.org/10.5772/37283.

The Skyscraper Center. "100 Tallest Completed Buildings in the World by Height to Architectural Top." Accessed March 4, 2020. https://www.skyscrapercenter.com/buildings.

Slow Food. "Our History." Accessed March 2, 2020. https://www.slowfood.com/about-us/our-history/.

Smil, Vaclav. *Two Prime Movers of Globalization: The History and Impact of Diesel Engines and Gas Turbines*. Cambridge, MA: MIT Press, 2010.

Snopek, Kuba. *Belyayevo Forever: A Soviet Microrayon on Its Way to the UNESCO List*. Grundlagen, Bd. 39. Berlin: Dom Publishers; Moscow: Strelka Institute, 2015.

Spearritt, Peter. "Why Melbourne Kept Its Trams." In *UHPH_14: Landscapes and Ecologies of Urban and Planning History. Proceedings of the 12th Australasian Urban History Planning History Conference*, edited by Morten Gjerde and Emina Petrović, 771–80. Wellington, NZ: Australasian Urban History / Planning History Group and Victoria University of Wellington, 2014. https://www.wgtn.ac.nz/wfadi/pdf/Proceedings.pdf#page=771.

Stephens, Mitchell. "History of Television." NYU Classes. Accessed December 17, 2019. https://www.nyu.edu/classes/stephens/History%20of%20Television%20page.htm.

Stevens, Harm. "'The Tumbling Child Belongs in the City Scene, Like Herring Carts': Playgrounds and Equipment by Aldo van Eyck." *Rijksmuseum Bulletin* 61, no. 4 (2013): 364–91.

Taylor, Jim. *DVD Demystified: The Guidebook for DVD-Video and DVD-ROM*. New York: McGraw-Hill, 1998.

Tilt, Bryan, Yvonne Braun, and Daming He. "Social Impacts of Large Dam Projects: A Comparison of International Case Studies and Implications for Best Practice." *Journal of Environmental Management* 90, suppl. 3 (July 2009): S249–S257.

Tourism New Zealand. "New Zealand Tourism: Facts and Figures." Last modified October 2, 2014. https://media.newzealand.com/en/story-ideas/new-zealand-tourism-facts-and-figures/.

Travel and Leisure staff. "The World's Most-Visited Tourist Attractions." *Travel and Leisure*, November 10, 2014. https://www.travelandleisure.com/attractions/landmarks-monuments/worlds-most-visited-tourist-attractions.

Uduku, Ola. "Modernist Architecture and 'the Tropical' in West Africa: The Tropical Architecture Movement in West Africa, 1948–1970." *Habitat International* 30, no. 3 (September 2006): 396–411.

UNESCO. Convention Concerning the Protection of the World Cultural and Natural Heritage, Article 5(d) (November 16, 1972). Available at https://whc.unesco.org/en/conventiontext/.

———. "Item 9 of the Provisional Agenda: Global Strategy for a Representative, Balanced and Credible World Heritage List, 9B. Reflections on Processes for Mixed Nominations." Convention Concerning the Protection of the World Cultural and Natural Heritage, WHC-14/38.COM/9B (April 30, 2014). https://whc.unesco.org/document/128806.

———. The Rio Declaration on Environment and Development (1992). https://web.archive.org/web/20190321151621/www.unesco.org/education/pdf/RIO_E.PDF.

———. "UNESCO in Brief—Mission and Mandate: UNESCO Headquarters." Accessed March 18, 2020. https://en.unesco.org/about-us/introducing-unesco.

UNESCO, ICCROM, and ICOMOS. The Nara Document on Authenticity (1994). https://www.icomos.org/charters/nara-e.pdf.

UNESCO International Program for the Development of Communication. *World Communication Report*. Paris: UNESCO, 1989. https://unesdoc.unesco.org/ark:/48223/pf0000188715.

UNESCO Statistical Division. *Statistics on Radio and Television, 1950–1960*. Statistical Reports and Studies ST/S/8. Paris: UNESCO, 1963. https://unesdoc.unesco.org/ark:/48223/pf0000033739.

UNESCO World Heritage Centre. "Heritage of Religious Interest." Accessed September 19, 2019. https://whc.unesco.org/en/religious-sacred-heritage/.

———. "What Is World Heritage?" Accessed June 29, 2019. https://whc.unesco.org/en/faq/19.

———. "World Heritage Committee Inscribes 61 New Sites on World Heritage List." News release, November 30, 2000. https://whc.unesco.org/en/news/184.

———. "World Heritage List." Accessed October 16, 2019. https://whc.unesco.org/en/list/?order=year&type=mixed.

United Nations. "Ethnic Cleansing." United Nations Office on Genocide Prevention and the Responsibility to Protect. Accessed October 15, 2019. https://www.un.org/en/genocideprevention/ethnic-cleansing.shtml.

———. "Non-Self-Governing Territories." The United Nations and Decolonization. Last modified May 14, 2019. https://www.un.org/dppa/decolonization/en/nsgt.

United Nations Centre for Human Settlements. *An Urbanizing World: Global Report on Human Settlements, 1996*. Oxford: Oxford University Press for the United Nations Centre for Human Settlements (HABITAT), 1996.

United Nations General Assembly. Resolution 61/295, United Nations Declaration on the Rights of Indigenous Peoples, A/RES/61/295 (September 13, 2007). https://www.un.org/development/desa/indigenouspeoples/declaration-on-the-rights-of-indigenous-peoples.html.

———. Resolution 217A, Universal Declaration of Human Rights, Article 23 (December 19, 1948). https://www.un.org/en/universal-declaration-human-rights/.

University of Arizona, College of Agriculture and Life Sciences. "History of Hydroponics." Accessed March 2, 2020. https://cals.arizona.edu/hydroponictomatoes/history.htm.

University of York. "Getting to the Heart of the Matter: CERN's Hidden Heritage." Phys.org. Last modified June 8, 2015. https://phys.org/news/2015-06-heart-cern-hidden-heritage.html.

UNLV Center for Gaming Research. "Macau Gaming Summary: Macau Gaming Timeline." Last modified January 25, 2019. https://gaming.unlv.edu/abstract/macau.html.

US Department of Transportation, Bureau of Transportation Statistics. "Freight Facts and Figures: Employment in For-Hire Transportation Establishments Primarily Serving Freight." Accessed March 2, 2020. https://data.transportation.gov/stories/s/Freight-Transportation-the-Economy/6ix2-c8dn.

US Department of Transportation, Bureau of Transportation Statistics, Maritime Administration, and US Coast Guard. *Maritime Trade and Transportation '02*. BTS 02-01. Washington, DC: US Department of Transportation, 2002. https://doi.org/10.21949/1501085.

US National Nanotechnology Initiative. "What Is Nanotechnology?" Accessed July 20, 2019. https://www.nano.gov/nanotech-101/what/definition.

Vale, Lawrence J. *Architecture, Power, and National Identity*. New Haven, CT: Yale University Press, 1992.

van de Giesen, Nick. "A Brief History of 20th Century Dam Construction and a Look into the Future." Paper presented at EGU General Assembly 2010, Vienna, Austria, May 2–7, 2010. https://ui.adsabs.harvard.edu/abs/2010EGUGA..12.2185V.

Viollet, Pierre-Louis. "From the Water Wheel to Turbines and Hydroelectricity: Technological Evolution and Revolutions." *Comptes Rendus Mécanique* 345, no. 8 (August 2017): 570–80.

Vladimirsky, Irena. "The Jews of Harbin, China." Museum of the Jewish People—Beit Hatfutsot. Accessed March 4, 2020. https://www.bh.org.il/jews-harbin/.

Volti, Rudi. "Automobiles and Leisure." In *Encyclopedia of Recreation and Leisure in America*, edited by Gary S. Cross, vol. 2, 49–57. Scribner American Civilization Series. Farmington Hills, MI: Charles Scribner's Sons, 2004. Accessible on Encyclopedia.com, https://www.encyclopedia.com/humanities/encyclopedias-almanacs-transcripts-and-maps/automobiles-and-leisure.

Wainwright, Oliver. "Apartheid Ended 20 Years Ago, So Why Is Cape Town Still 'a Paradise for the Few'?" *The Guardian*, April 30, 2014. https://www.theguardian.com/cities/2014/apr/30/cape-town-apartheid-ended-still-paradise-few-south-africa.

Wall Street Journal. "Phonograph Operated on Transistors to Be Sold by Philco Corp." June 28, 1955, 8.

Walmart. "Our History: Timeline." Accessed August 23, 2019. https://corporate.walmart.com/our-story/our-history#timeline.

Walton, Brandon. "A Brief History of Solar Energy." Solar United Neighbors. Last modified November 19, 2015. https://www.solarunitedneighbors.org/news/brief-history-solar-energy-2/.

Wedgeworth, Robert, ed. *World Encyclopedia of Library and Information Services*. 3rd ed. Chicago: American Library Association, 1993.

Wiegand, Wayne A., and Donald G. Davis Jr., eds. *Encyclopedia of Library History*. Garland Reference Library of Social Science, vol. 503. New York and London: Garland, 1994.

Wolf, Winfried. *Car Mania: A Critical History of Transport, 1770–1990*. 1st English ed. London: Pluto Press, 1996.

Wolmar, Christian. *Blood, Iron, and Gold: How the Railroads Transformed the World*. New York: PublicAffairs, 2010.

World Bank. *Russian Economic Report No. 22*. Washington, DC: World Bank, 2010. http://documents.worldbank.org/curated/en/974021468092953100/Russian-economic-report.

World Bank Open Data. "Access to Electricity, Rural (% of Rural Population)." Accessed March 2, 2020. https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS.

———. "Access to Electricity, Urban (% of Urban Population)." Accessed March 4, 2020. https://data.worldbank.org/indicator/EG.ELC.ACCS.UR.ZS?end=2017&start=1990.

———. "Container Port Traffic (TEU: 20 Foot Equivalent Units)." Accessed January 9, 2020. https://data.worldbank.org/indicator/IS.SHP.GOOD.TU?view=map&year=2000&year_low_desc=true.

———. "Rail Lines (Total Route-Km)." Accessed January 2019. https://data.worldbank.org/indicator/IS.RRS.TOTL.KM?view=chart.

World Commission on Environment and Development. *Our Common Future*. Oxford: Oxford University Press, 1987.

World Health Organization. "The Smallpox Eradication Programme—SEP (1966–1980)." Last modified May 2010. https://www.who.int/features/2010/smallpox/en/.

World Nuclear Association. "Outline History of Nuclear Energy." Last modified April 2019. https://www.world-nuclear.org/information-library/current-and-future-generation/outline-history-of-nuclear-energy.aspx.

Yago, Glenn. *The Decline of Transit: Urban Transportation in German and U.S. Cities, 1900–1970*. Cambridge: Cambridge University Press, 1984.

Yeung, Yue-man. "Rethinking Asian Cities and Urbanization: Four Transformations in Four Decades." *Asian Geographer* 28, no. 1 (2011): 65–83.

Zarecor, Kimberly Elman. *Manufacturing a Socialist Modernity: Housing in Czechoslovakia, 1945–1960*. Series in Russian and East European Studies. Pittsburgh: University of Pittsburgh Press, 2011.

Zinn, Howard, Mike Konopacki, and Paul Buhle. *A People's History of American Empire: A Graphic Adaptation*. New York: Metropolitan Books, 2008.

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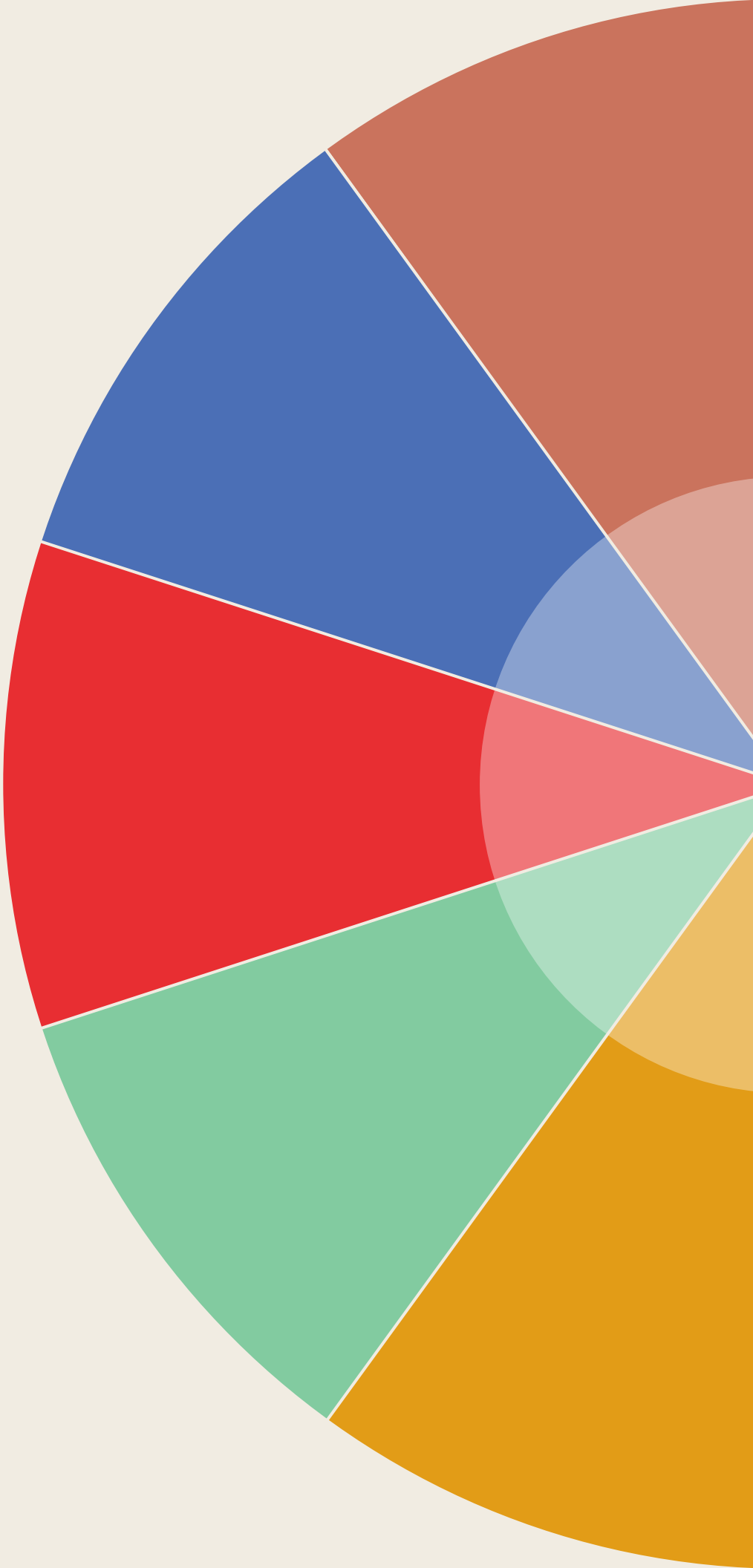

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