The rehabilitation/redevelopment of urban centers is costly and once begun will take several years to accomplish. It is most efficiently completed in stages by discreet neighborhoods within a city and by prioritized need in adjoining shantytowns/slums. The time to start a renewal process is now as pressures from growing populations increase daily as evidenced by the demographic projection that the 2018 city population of ~4 billion people will rise to 6.9 billion by 2050 fueled as already noted by births, rural citizen in-migration, and sometimes immigration. Today, as previously stated, there are scores of millions of people living in shantytowns/slums in developing and less developed nations especially in Asia and Africa, but also in South America. For most people living in these squalid conditions, basic needs for a reasonably good quality of life are not being provided. What can be expected in terms of social stability as years pass to 2050 and beyond? Restless masses demanding change are a likely answer if indeed municipalities and nations do not show progress to a better life by steadily improving delivery of basic needs to citizens as each year passes. Progress begins slowly with small but real improvements in living conditions in shantytowns/slums by providing basic services that contribute to good public health (safe water, access to adequate sanitation, and regular garbage collection).

8.1 Economic Reality of Urban Rehabilitation to Service Underserved Shantytown/Slum Inhabitants

Efficient use of economic, human, and natural resources are the three fundamentals through which living conditions can be improved for shantytown dwellers living in urban centers or agglomerated to them. By extension, these improvements will benefit the general public as well with overall better public health, greater opportunities for employment, and sustainable essential resources.
Constructing a purpose-built major city from scratch is a rarity and requires great investment. The new capital city Brasilia was built in mid-twentieth century from 1956 to 1960 that today houses all national government facilities and 2.8 million people in the city proper and abutting urban districts. The construction took place amidst an economic boom by national self financing with the tax income mainly from the mining, agriculture, and forestry sectors. During the 1980s, Abuja was built with national self financing from the oil sector. During the 1990s, Astana Modern City, Kazakhstan was purpose built, financed mainly by income from the oil sector. It had an initial population of 281,000 people but today has more than one million inhabitants. No reliable costs for the building of the three new capital cities were available. In 2017, estimated costs to build new cities that have twice the population of Brasilia, Abuja, or Astana would likely be in the hundreds of billions of dollars range. In 2017, rehabilitation of cities or creating mega-cities by meshing multiple cities together is extremely costly as described in the following paragraphs.

8.2 Examples of Projected City Rehabilitation/Redevelopment Costs and those for Purpose Built Cities

8.2.1 India

The costs of rehabilitation/redevelopment of major or minor cities in the twenty-first century are great. They have to be distributed over a relative long term (e.g., 7–10 years) for projects designed to better the living conditions for in city and peripheral neighborhoods with underserved or unserved populations as well as to promote economic development that can provide meaningful employment that includes less advantaged segments of an urban population. This cannot be done all at once but has to be prioritized and completed in stages. For example, Indian Prime Minister Modi put forth the “Smart City” project cited earlier (Sect. 1.5) for planning started in 2015 with US$15.4 billion initially for about 100 cities of various population sizes (US$7.5 billion) and rejuvenation of 500 others with populations greater than 100,000 people (US$7.9 billion) [1]. He expects a final cost for rehabilitated Indian cities to be US$300 billion over a several year time frame. During the initial phase of the program 20 of the 100 cities were chosen to serve as pilot projects with each receiving US$31 million during the initial financial year and US$16 million during each of the following 3 years. As stated previously, priority will be given to solve five basic needs to improve citizens’ health and quality of life. As described in section 1.5, these are: (1) to provide safe water 24/7; (2) to provide toilets and daily collection of honeypots from unsewered neighborhoods; (3) improve public transportation including designating one way streets and lanes dedicated to buses or other vehicular transport to reduce traffic snarls; (4) site elementary schools no more that 400 m from homes; and (5) make Wi-Fi available...
throughout a city [2]. If the designated funding is used prudently and not subject to loss through corrupt practices (bribery, extortion) in the permit-supply-rehabilitation construction stages, there should be positive results within a reasonable time frame. If this initial effort shows positive results for the people in the 20 cities, the way will be paved to invest US$300 billion or more in other Indian cities and rural centers to improve living conditions for all their citizens. This, of course, depends on the continued growth of the Indian economy even as its population continues to grow.

8.2.2 China

China is planning what will be the largest global mega-city. The plan is to merge 9 cities with 42 million inhabitants in the Pearl River delta area, an important manufacturing region that accounts for almost 10% of China’s economy. The three cities with the highest populations are Guangzhou, Shenzhen, and Dongguan with 11.7, 8.9, and 6.4 million citizens, respectively. The 9 cities will have a united policy to control industrial pollution. They will be connected by a high speed rail system as part of the 150 major infrastructure projects that will mesh transport, energy, water, and telecommunication systems. The estimated budget is US$196 billion for the rail infrastructure and US$304 billion for the other infrastructure projects and will be self funded [3]. These estimates will likely rise because of overrides and inflation during the optimistic 6 year program to complete the integration of the 9 cities into one huge metropolis that will cover more than 750 mi² (1200 km²). The Chinese government will have to establish checks and balances transparency procedures to prevent or greatly limit corruption that will surely target this undertaking. Under President Xi, the fight against bribery and extortion in China by corrupt officials has successfully begun and will continue. There are relatively few countries with a strong economy and the financial strength to self fund such a high cost undertaking.

8.2.3 Egypt

Egypt has plans for a new capital city for about 5–7 million inhabitants east of Cairo between it and the Red Sea. All national government buildings would move to the new capital city. The expectation is that the new city would relieve the population pressure and congestion experienced in Cairo with its more than 17 million citizens in 2017 but that is projected to double by 2050. The plans are grandiose and call for multiple residential and dedicated districts with 1.1 million homes, multiple business operations, 2000 schools and colleges, 663 healthcare facilities, 1250 mosques and churches with the infrastructure to service all the city’s needs, and the creation of one million jobs. The cost to plan and begin to build the initial phase of the new city is estimated at US$45 billion with significant funding to come from outside
(e.g., pledges of US$4 billion each from Kuwait, Saudi Arabia, and the UAE). The total estimated cost to complete the new city that will cover an area of 270 mi² (432 km²) when completed in what was hoped to be 5–7 years is US$300 billion [4]. Given that the gross domestic product for the country was estimated at US$342 billion for 2015 and because of serious concerns from potential lenders and investors given the mixed success in past decades in attracting population to new cities in the desert, President al-Sisi deemed it prudent to put a hold on the project.

8.2.4 Nigeria

Abuja is a purpose-built new capital city to replace Lagos as Nigeria’s capital. The site selected as a replacement for Lagos’ squalor, has a fine climate in central Nigeria, has land for expansion, and is surrounded by hilly terrain and savannah grasslands. The city was completed during 1987 and in 1991 was officially designated as the capital. No cost figures have been published but was likely in the range of US$100s of millions. It has been the fastest growing city in Africa with an annual average population increase of 13.9% between 1991 and 2015 for the metropolitan area. The Abuja City had population at the last census (2006) of well over three quarters of a million inhabitants. The population continues to grow. The increasing population has put a strain on the urban infrastructure so that there had to be a dam expansion and added capacity of water treatment capacity to meet clean water needs. Waste collection capacity also had to be increased. With satellite cities and small settlements, Abuja has a 2017 metropolitan population of almost two and a half million people. As has happened in many urban centers in developing and less developed countries, people in search of employment, family healthcare, and good education for children, flocked in and squatters created slum settlements in the modern city and in the city outskirts. The government did not want Abuja to become another Lagos with its squatter problems. The Center for Housing Rights and Evictions based in Geneva and the Social and Economic Rights Action Center in Nigeria reported that between 2003 and 2007 the Nigerian government razed 31 informal settlements and estimated that 800,000 citizens were displaced and resettled in areas some with poor soils and sometimes without access to enough safe water [5].

8.2.5 Saudi Arabia

In March, 2018, Saudi Arabia announced that a mega-city, by size and not population, would be built in the northwest of the country bordering the Red Sea under the project name NEOM (New Future). It would be designated as a special zone. An area of 26,500 km² (10,231 mi²) is dedicated to the new city and its vast
surroundings including 1000 km² (625 mi²) of Egypt’s southern Sinai for which Egypt received a Saudi Arabia grant of US$10 billion for planning, and a small area of Jordan. The city is planned as a high tech center that would diversify the oil-based Saudi Arabian economy. Development emphasis would be in several sectors including energy and water, mobility and transport, biotechnology, food, technological and digital sciences, advanced manufacturing, media and media production, and entertainment. The stimulus for development and an attraction for international investment would be favorable business regulations in the specialized zone free of most governmental frameworks such as taxation, customs, labor laws and other regulation parameters on business. The Kingdom of Saudi Arabia and the Saudi Arabian Public Investment Fund is backing the project with US$500 billion [6, 7].

One question I would raise would be availability of renewable water. This area of Saudi Arabia has 2 km³ or 2 billion m³ of renewable water in rivers that also feed aquifers in alluvial sediments that supply 10% of the country’s drinking water. If a per capita allowance of 500 m³ (a stress value) is planned, this would sustain 4 million inhabitants. The Saudi Arabian per capita renewable water was between 65 and 75 m³ in 2014 and will be less in 2035 (Table 2.5). To make up the great water deficit, the Kingdom generates its drinking water needs from more than a score of desalination plants (50%) and confined (not renewable) aquifers (40%) as well as the 10% from renewable sources in the planned mega-city region. As has been stressed in previous chapters, the extraction of groundwater must be balanced by groundwater recharge lest the source of water be lost and/or detrimental subsidence affects the area. Finally, the effect of global warming on the water budget for the mega-city in future years, (e.g., 2035, 2050), based on updated Intergovernmental Panel on Climate Change reports, has to be factored in to the master plans for NEOM, especially the response of river sources from snow melt in the surrounding mountains.

8.3 Outside Funding for Mega-Projects to Rehabilitate Cities with Large Under-Serviced Populations

There are few nations that can self finance such large scale comprehensive ‘fix it’ projects. Outside funding to complement national funding is the only way most nations can begin the rehabilitation/redevelopment of many major cities in order to serve their populations, thus enhancing their quality of life and hope for the future of their children.

As described in the previous section, India is financing the rehabilitation/redevelopment of important needs in existing cities with a 20 city pilot project and a budget of US$79 million each over 4 years (US$31, +US$16, +US$16, +US$16 million) from taxation mainly from the manufacturing, industrial and service sectors and input from the states and cities, and with contributions from the United States, Singapore, Spain, France, Germany, and Japan. Rehabilitation/redevelopment of existing major cities with grave social, economic, and infrastructure
problems can be, in some cases, as costly as building a new city, a cost that can not be borne by a nation itself during the time rehabilitation/redevelopment takes place. Thus, less developed and developing nations will require much external financing to complement available self-funding via low cost, long term loans, and grants from international banking institutions and from economically strong nations wanting to improve political relations, and/or cultivate access to a receiver nation’s natural resources. This is the situation for many nations with highly populated cities and mega-cities in Asia, Africa, and for some in South America.

8.3.1 Sources of Funding for Development/Redevelopment to Reduce Poverty and Improve Living Standards for Underserved People

Nations with the task of finding funding to redo their highly populated cities so that they function more efficiency and bring services to underserved neighborhoods have to invest in experienced planning teams to prepare detailed plans of what can and will be done to improve living conditions for all citizens. The plan must include controls on finances to assure transparency that stunts corruption that in some countries is ‘a way of life’ for the corrupters and those who support them directly or by turning a blind eye to their activities for a price. The plan would be to assure the public of the many essentials to sustain a stable society including the already repeated safe water, access to adequate sanitation, health care, readily accessible transport systems, and education. As a result, this will better living and working conditions for an entire urban population. Finally, a proposal to lenders should have a schedule for repayment of loans that they take out. International and national institutional lenders that may support such proposals include the International Bank for Reconstruction and Development (IRBD, a division of the World Bank Group), and the following regional development institutions: European Bank For Reconstruction And Development, the recently established Asian Infrastructure Investment Bank, the African Development Bank, and the Inter-American Development Bank. National agencies such as the United States Agency for International Development created by President John F. Kennedy awards grants to support necessary and well planned development projects as do the EU Europe Aid Development and Cooperation Unit, the French Development Agency, Germany’s Economic Cooperation and Development Unit, The Japan International Cooperation Agency, the Norwegian Agency International Development Program, the UK Department for International Development, and others. Development/cooperation agencies such as the United Nations Development Program including its Food and Agriculture Organization component may provide technical support in lieu of funding.
8.3 Outside Funding for Mega-Projects to Rehabilitate Cities with Large…

8.3.1.1 Alternate Funding Source through the World Bank Group

The International Finance Corporation (IFC) of the World Bank Group encourages private ventures to assist developing countries to reach sustainable growth. The IFC does this by financing investment with capital it makes available from international sources. Another division of the World Bank Group, the Multilateral Investment Guarantee Agency (MIGA) complements the IFA mission by encouraging direct foreign investment in developing countries with access to guarantees (risk insurance) to investors and lenders.

8.3.2 Qualifications for Loans/Grants

The eligibility for development loans and grants that are made and the types of loans or grants available by the IBRD and the International Development Association (IDA) of the World Bank Group is membership in the World Bank. The Bank has 189 member countries. Whether a development loan/grant originates from the IBRD or the IDA is determined by a country’s per capita gross national income and falls into two categories. Lower Income Countries (LIC), the poorer ones, have per capita annual incomes of US$1005 or less. These can receive IDA loans/grants. Middle Income Countries (MIC), those in a better development stage, can apply for IBRD loans/grants. These are divided into Lower MICs with per capita annual incomes of US$1006 to US$3955 and Upper MICs with per capita annual incomes of US$3956 to US$12,235. These figures change as the global economic status changes. Those given above are for 2016. Other World Bank members are not eligible for loans/grants. Seventy-nine countries are eligible for IBRD lending whereas 64 countries are eligible for IDA lending. There are 17 countries that can receive loans that are a blend of the two granting divisions. Conditions for a loan vary. The IDA loans to the LIC countries are given at zero interest for 40 years with a 10 year grace period. In general, the IBRD loans have an interest rate slightly above the market rate and are to be repaid in 12–15 years. It is likely that the development institutions listed in the previous paragraphs and others follow similar norms adjusted to their bylaws.

8.3.3 Grounds for Requesting Development Loans/Grants

The World Bank supports development projects that are sustainable and help to reduce poverty and improve the quality of life for impoverished citizens. In general, the lending institutions will provide technical assistance to government experts in the design and implementation of development projects. This implies negotiations that bring agreement on project primary and secondary objectives, agreement on productivity output as evaluated by performance measures, and finally agreement on stage implementation of a supported project. Table 8.1, modified from the World
Bank, presents the sequence that could be followed in the preparation and submission of a development proposal that should also reduce poverty [8, 9]. As such, investments are in infrastructure for improving a clean water supply, access to adequate sanitation and waste disposal, electricity, roads, and urban regeneration/redevelopment.

Financial institutions are supportive of social development that can improve chances for long term increased productivity such as education and transfer of knowledge, healthcare services including nutrition advice, and agriculture via improved rural service advisors. Investments may support industrial projects that offer employment not only during construction but also after it and that result in additional employment in small businesses that supply goods and services to large projects. Investment in institutional development should bring about environmental protection regulation that prevents pollution that affects people and ecosystems, as well as stopping corruption, and insuring personal security through the law and an independent judicial system. In recent years attention is focusing on projects that show that they can readily adapt to global warming/climate change. All these aspects have to be considered in tailoring proposals for development submitted to specific lending institutions.

Proposals for financial assistance for rehabilitation/redevelopment of cities with high populations where many citizens live in poverty in shantytowns or slums underserved or not serviced by basics for a sustainable good quality of life will be judged in part by costs benefits analysis. This evaluation is based on assessments of short and long term economic data. In addition, the analysis should consider the

### Table 8.1  Stages in lending cycle from conception to implementation, completion, and post-completion evaluation

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A country’s proposal for obtaining a loan or grant for a development project that will be economically beneficial, reduce poverty, and improve the quality of life for its less advantaged citizens (e.g., extend clean water and sanitation networks)</td>
<td>Discussions with the lender on strategies to carry out the project including changes that improve the efficiency, consider consultant suggestions and technical assistance as needed, and put in place financial safeguards against corruption with the possibility that the project may be dropped at any time</td>
</tr>
<tr>
<td>Make proposal available to public for input from affected parties and experts not associated with the proposal</td>
<td>Preparation of the reworked proposal that includes monthly reports and reports as stages are completed</td>
</tr>
<tr>
<td>Negotiations with the lender on terms of a loan and of disbursement of funding as project stages are completed and new stages are ready to start as well as review of the need for additional technical assistance</td>
<td>Loan is approved so that project can be implemented under strict supervision and presentation of stage reports as agreed upon</td>
</tr>
<tr>
<td>Implementation to completion and a final status report</td>
<td>Post project completion evaluation to bring to light how efficiency can be improved for like future projects</td>
</tr>
</tbody>
</table>

Modified from World Bank lending project cycle [8, 9]
long term social and environmental benefits, and capacity to adapt to new realities such as the effects of changing climate. A proposal must include as well a government’s commitment to be responsible for the maintenance and sustainability of the rehabilitated/redeveloped urban systems that exist and those will be created with the requested financing.

8.4 Human and Other Natural Resources

Important factors to include in proposals for long term large scale projects include human resources, technical resources, and natural resources available to support the planned rehabilitation/redevelopment. The human resources without which planned projects could not be accomplished include manual laborers, heavy machinery operators, and experienced construction/reconstruction personnel (e.g., carpenters, roofers, electricians, plumbers, mechanics/repairmen, heating/air conditioning installers). An able workforce as given above and given in the following sentences should receive acceptable wages and benefits as befit their jobs. Basic to the reworking of an urban center are police to keep a city safe and moving during reconstruction and firefighters and medical personnel to respond to emergencies that may arise. Technical personnel from national colleges/universities that can contribute to a redevelopment proposal are scientists (geologists, biologists, chemists, environmentalists, and engineers [civil, code savvy, sanitary, mechanical, electrical, industrial, quality control, transportation]) and hazard risk assessors. The risk assessors should include adaptation protocols to mitigate existing and projected threats from global warming/climate change data as they may evolve during the century. The greater input there is from qualified, experienced, national and international experts will be positive for lender/grantor evaluation of a request for funding. This emphasizes the need to support educational institutions to be certain that people will be trained and educated to keep rehabilitated/redeveloped projects sustainable for a nation’s future.

A nation’s ability to provide natural resources for redevelopment construction and to sustain a good standard of living for all citizens when the job is done and for future populations that will settle in a city is important to proposal reviewers in their decision making. This would include wood, metal ores and industrial rocks and minerals and capacity to refine them into building materials (e.g., steel, cement, concrete, copper). Proposal reviewers will want to know the energy resources planned to service all users of a redone city (e.g., coal, oil, natural gas, nuclear, hydroelectric, solar, wind) and the ability to deliver energy to all as a city population increases. The goal of urban rehabilitation/redevelopment is to achieve full livability. As emphasized in past chapters, basic to sustainable livability are water security and food security, topics that have to be addressed in a proposal for financing a city rehabilitation project to demonstrate to evaluators that a growing city population can be sustained health wise and nutritionally.
References

2. Government of India. What is a smart city? Online. smartcities.gov.in/content/innerpage/what-is-smart-city.php click on 'read more'.