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メタデータ	言語: eng 出版者: 公開日: 2017-10-05 キーワード (Ja): キーワード (En): 作成者: メールアドレス: 所属:
URL	<a href="http://hdl.handle.net/2297/47854">http://hdl.handle.net/2297/47854</a>

# Building Resilient Cities through Community Empowerment: Principles and Strategies for Taiwan

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Received: Oct 25, 2016; Accepted: Dec 30, 2016

**Key words:** Climate change adaptation, Resilience, Resilient city, Community empowerment

**Abstract:** IPCC AR5 notes that since the 1950s, changes in climate systems, ocean, sea levels, icebergs, carbon and other biochemistry have been unprecedented. If the emission rate of greenhouse gases remains constant or increases, then the effects of climate change will become severe. Accordingly, research on vulnerability, mitigation and adaptation of climate change is required. With respect to those considerations, development of the concept of resilience and the construction of resilient cities has become a critical and important task for sustainable urban and regional development. This study begins by providing a brief introduction of the significant impacts of climate change globally and, in particular, in Taiwan. The second section analyzes concepts related to resilient cities, including vulnerability, adaptation, resilience, governance and community empowerment. The third section proposes principles to govern the construction of resilient cities through community empowerment, based on a literature review and documentary analyses. The final section presents conclusions and suggestions.

## 1. INTRODUCTION

Climate change has brought new challenges, including uncertainty in climate change and various impacts on everyday life ([Andersson-Sköld et al., 2015](#); [Archer et al., 2014](#); [IPCC, 2014](#); [UNEP FI Principles for Sustainable Insurance Initiative, 2014](#); [The Royal Society, 2014](#)). In the upcoming decades, the major driver of damage and losses that are caused by associated disasters will be the growth of populations and assets in harm's way, especially in urban areas ([IPCC, 2012](#); [Revi et al., 2014](#)). Therefore, interest in urban resilience is growing ([Chelleri, 2012](#); [Kernaghan & da Silva, 2014](#); [Lee, 2015](#); [The Royal Society, 2014](#)). Cities, municipalities and counties may also use climate change-related strategies to achieve such objects as sustainable and efficient energy use and renewable energy production, and provide a context within which both relevant behavioral and relevant technical innovations may arise and spread ([Burch, Herbert, & Robinson, 2015](#); [Lee, 2015](#)). Cities are centers of innovation, which is a key component of resilience ([Kernaghan & da Silva, 2014](#); [Rose, 2014](#)).

Often located along coastlines, in flood plains, or on seismic rifts, cities with their concentrations of assets and people are vulnerable to disasters ([Jha, Miner, & Stanton-Geddes, 2013](#)). They must adapt to past and future effects of climate change, despite related uncertainty and unknown risks and its local effects ([Andersson-Sköld et al., 2015](#); [Archer et al., 2014](#); [IPCC, 2012](#); [Pelling, 2010](#)). Cities must constantly improve their communication and management of risk, early warning systems, emergency contingencies, evacuation plans, and recovery plans. While long-term trends in losses have not yet been attributable to natural or human-made disasters, climate change adds to city planning and management a dimension of additional risk and uncertainty ([IPCC, 2012](#)).

Numerous contexts of climate change that have been studied in the literature suggest that a holistic framework is required to address both urban sustainability and urban resilience ([Kernaghan & da Silva, 2014](#); [Rose, 2014](#)). The goal of these studies is to elucidate policies and strategies in which flexible and “low-regret” measures can be cost-effective even when risks, of which many must be faced, are uncertain ([World Bank, 2012](#)). Considering the existence of unknown risks and uncertainties, resilience depends on redundancy ([Marcotullio & Price, 2015](#)). Cities that are facing difficult decisions concerning limited resources and investments must strive for efficiency, and consequently make trade-offs between resilience and redundancy ([Montenegro, 2010](#); [Jha, Miner, & Stanton-Geddes, 2013](#)).

Taiwan is located in the Western Pacific Region, which is an area that is hit by frequent typhoons and under the influence of many meteorological effects. The presence of short rivers with narrow mouths and ongoing reduction in green open spaces contribute to low water drainage rates and reduced capacity for lands to contain and store water, promoting disasters such as floods and mud landslides. Since the 1980s, the urban population has exceeded the rural population. In 2014, Taoyuan Municipality became the sixth largest municipality in Taiwan by population. Since then, people who live in the six municipalities have come to represent more than 70% of the total population, making Taiwan an urbanized island state. As the massive rural-to-urban migration continues, cities are increasingly becoming the focus of attempts to transition to sustainability ([Nevens et al., 2013](#)).

Taiwan is facing a great challenge from climate change and inappropriate land development. Floods and debris flows that are caused by torrential typhoon rains have become increasingly common, resulting in severe loss of land, soil and water resources, and environmental degradation ([Council for Economic Planning and Development \(CEPD\), 2012](#)). Climate change is also likely to have a large impact on urban populations in Taiwan ([Lee, 2014](#)). Therefore, adaption to climate change is a growing concern in Taiwan. In 2012, the government of Taiwan issued the national adaptation plan, Adaptation Strategy to Climate Change in Taiwan ([Council for Economic Planning and Development \(CEPD\), 2012](#)). In 2014, the National Development Council (NDC) identified three metropolitan areas (Taipei, Taichung and Kaohsiung) as the primary focus for urban climate change adaptation plans and strategies.

Appropriate responses to the climate change impacts, keeping in mind the limited resources, and maintaining a stable balance of natural ecosystems will ensure the security of Taiwanese people and help move toward sustainable development ([Lee, Lin, & Chen, 2016](#)). These responses include the establishment or modification of the relevant Acts, collecting and analyzing all kinds of disasters’ big data, effectively controlling urban population density and managing growth in the city, increasing the ability to

integrate and to allocate disaster prevention and rescue resources, building more effective disaster warning systems, and reviewing the current disaster-related financing measures of reconstruction and restoration. In addition to these top-down responses, bottom-up community empowerment can reflect local characteristics and community needs and further reduce the transaction costs of implementing climate change policies and help move toward a more resilient society.

In response to increasingly severe impacts of climate change and emerging demand for resilient cities and communities, this study firstly introduces significant impacts of climate change both globally and particularly in Taiwan. The second section analyzes concepts related to resilient cities, including vulnerability, adaptation, resilience, governance and community empowerment. The third section describes the mechanisms for resilient community development in Taiwan. The fourth section proposes principles, guidelines and strategies for constructing resilient cities by community empowerment, based on a review of the literature, in-depth interviews, focus group discussions and documentary analyses (concerning local climate change adaption plans). The final section draws conclusions and offers suggestions.

## 2. CONCEPTS OF RESILIENT CITY AND RESILIENT COMMUNITY

Resilience is the ability of a system, community, or society that is exposed to hazards to resist, absorb, accommodate, and recover from the effects of a hazard promptly and efficiently by preserving and restoring essential basic structures and functions ([United Nations International Strategy for Disaster Reduction \(UNISDR\), 2011](#)). The [IPCC \(2014\)](#) has defined resilience as “the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.” [The Royal Society \(2014\)](#) has defined resilience as “the capacity of individuals, communities and systems to survive, adapt, and grow in the face of stress and shocks, and even transform when conditions require it.”

Resilience can be specific or general ([The Royal Society, 2014](#)). General resilience and specific resilience must be consisted together because being highly resilient to one stress or shock can increase vulnerability more generally ([Folke et al., 2010](#)). In the context of cities, resilience is evolving as a new paradigm for urbanization and affects our understanding and management of urban hazards, as well as urban planning in general ([Jha, Miner, & Stanton-Geddes, 2013](#)). A resilient community can respond positively to a stress or shock and thereby retain its basic structures and maintain the provision of services ([Resilience Alliance, 2002](#)).

The concept of resilience can be applied to any community and any type of disturbance - natural, man-made, or a combination of the two. Examining disaster risk in the context of resilience helps urban planners to elucidate the many impacts of disasters and determine the long-term capacity of communities both to adapt to and to cope with uncertain risks ([Jha, Miner, & Stanton-Geddes, 2013](#)). Briefly, resilience can be used as an umbrella term

that dynamically links existing concepts of risk and sustainability ([The Royal Society, 2014](#)).

All levels of government (central, regional and local) have an obligation to protect their citizens. However, since local governments are the first institutions to respond to disasters, they have a particular obligation to reduce risk and build resilience within their communities ([United Nations International Strategy for Disaster Reduction \(UNISDR\), 2011](#)). Governments are responsible for managing and communicating risk. Constructing and enforcing the responsibility of city and municipal governments to manage and communicate risk effectively can be challenging, in part because doing so requires a perspective that temporally extends beyond elected terms ([Jha, Miner, & Stanton-Geddes, 2013](#)).

Policies, planning and construction in all city or municipality districts must take resilience into account to ensure that enhancements in resilience are gained across whole cities or municipalities, rather than in one community at the expense of another ([Arup & Siemens, 2014](#)). Resilience goes beyond risk management and mitigation: it increases not just preparedness but also the capacity to respond to disasters and rapidly recover from them. Resilience must be part of everyday urban development, short-, medium- and long-term investment and planning, hazard management, and urban governance ([Jha, Miner, & Stanton-Geddes, 2013](#)).

Community-based solutions that build social capital can be an important part of generating urban resilience ([Revi et al., 2014](#)). Community-based adaptation refers to the participatory identification and implementation of community-based development activities that increase the capacity of local people and community to adapt to climate change, and building on communities' expressed needs and perceptions to address local development concerns that are related to vulnerability ([Ayers & Forsyth, 2009](#)). Civil society can have a role in preparing for climate change, both through local non-governmental organizations (NGOs) and local communities, which integrate adaptive governance methods with tools for participatory planning ([Archer et al., 2014](#)).

### **3. MECHANISMS FOR RESILIENT COMMUNITY DEVELOPMENT IN TAIWAN**

It is critical to point out that the historical development of empowerment in development theory and practice is related to that of participation since the two concepts are products of social movement and struggle for liberation toward transforming prevalent social ([Pettit, 2012](#)), economic and political structures. Individuals must be involved proactively in solving problems rather than only opposing governmental policies. Such involvement requires self-sustaining, bottom-up participation ([Grimm, 2011](#)). Community participation in policy and plan formulation and/or implementation has received growing interest worldwide ([Bailey & Pill, 2011](#); [Eversole, 2011](#); [Grimm, 2011](#); [Pettit, 2012](#); [Rahman, 2015](#)). Although participatory communities may be communities of interest and/or communities of place, the focus is typically on place-based communities, based on their local knowledge and related policy insights ([Grimm, 2011](#)).

Given the significance of community participation and cross-sector collaboration in sustainable and resilient community development, the Taiwan Government enthusiastically encouraged community residents to

become involved in planning and designing sustainable and resilient community practices. As an empowerment process, community planning and design focused on individuals in place can benefit communities of any scale, from neighborhoods to districts to towns/cities to regions ([Grimm, 2011](#)). Take Taipei City as an example, since 1996, the Taipei City Government has disseminated environmental reform programs to improve communities via spatial strategies as the primary focus of community building programs in order to enhance the quality of living. Since then, the Taipei City Government has enacted community planning and empowerment programs, including a community planner system and numerous educational programs for young community planners. The Government further strived to achieve community empowerment by establishing the Community Empowerment Network, Taipei (CENT) in 2003 ([Lee, 2017](#)).

CENT functions as a platform to facilitate communication between citizens, community organizations, industries and governmental sectors. In addition to assisting citizens in holding community planning and environmental reform activities, CENT also serves as an important platform for sustainable and resilient community development and empowerment in Taipei. Following the establishment of branch offices in 2011, CENT has coordinated with these branch offices in holding diverse activities such as helping communities to achieve sustainability goals and to become resilient communities.

Sustainable and resilient community selection in Taipei was conducted by CENT. Various organizations and agencies, including community planners, neighborhood leaders and other NGOs, also promulgated sustainable and resilient community selection information and instructions to communities in Taipei. CENT invited proposals from the communities. Following several working meetings and inspections of the proposals, the reviewing committee assessed and ranked the candidates for planning and devising sustainable and resilient community practices. CENT continued to provide counselling services to those communities not selected for the demonstration projects of sustainable and resilient community development ([Lee, 2017](#)).

For example, in 2013, 14 communities were selected to participate in community empowerment building programs. In 2014, 26 communities participated in sustainable and resilient community building, focusing on issues such as aging society, environmental friendly design, creative community design and sustainable community construction. In 2015, there were 18 communities engaged in community empowerment practices. In addition to the existing programs, a new dimension (resilient community construction) was promoted. During the three-year period, the 58 communities have helped the Taipei City Government to move toward sustainability and resilience goals through bottom-up community empowerment.

#### **4. PRINCIPLES FOR CONSTRUCTING RESILIENT CITIES**

Since urban adaptation to climate change is a relatively new field, and adaptation activities must be context-specific, no standards currently exist for planning and adaptation on the city scale, and various cities have used different approaches to planning and implementing adaptation-related



activities ([Anguelovski & Carmin, 2011](#); [Jha, Miner, & Stanton-Geddes, 2013](#); [Archer et al., 2014](#)).

Planning for climate change may involve vulnerability analyses, risk assessments and mitigation strategies, including at the community level ([Jha, Miner, & Stanton-Geddes, 2013](#)). However, significant gaps remain in inclusive approaches to urban adaptation that can only be filled by community-level knowledge and adaptation activities ([Archer et al., 2014](#)).

In the field of urban planning, decision makers face a trade-off between adequate preparedness and the potential future costs of response, recovery, and reconstruction after a disaster. The aftermath of a natural disaster frequently provides an opportunity to decision makers to take corrective and even preventive actions. A World Bank report on the economics of natural disasters provides empirical evidence of large returns from preventive measures ([World Bank, 2012](#)).

A recent review of the resilience literature distilled ten core characteristics of resilience that pertain to climate change and related disasters, including high diversity; effective governance and institutions; the ability to work with uncertainty and change; community involvement and the appropriation of local knowledge; preparedness and planning for disturbances; high social and economic equity; robust social values and structures, acknowledgement of non-equilibrium dynamics, continual and effective learning and the adoption of a multi-scale perspective ([Bahadur, Ibrahim, & Tanner, 2013](#)).

However, technology alone cannot make urban infrastructure resilient, and it will not be at all in the absence of suitable climate for the required investments. Technology can provide benefits only if system operators are equipped to use and act upon the information and controls that it can provide. Changing social, political and economic conventions are as essential to the success of city resilience initiatives as is upgrading physical assets. Based on a review of the literature, local climate change adaptation plans in Taiwan, in-depth interviews and focus group discussions, this work identifies five aspects of city governance and operations that together provide the important “enabling framework” for planning, investment and action to improve urban resilience.

Taiwan is composed of 22 municipalities and counties, of which 20 have issued local climate change adaptation plans and two are drafting such plans. The budget for drafting and issuing these plans was provided by the Council for Economic and Planning Development, started in 2012 after Taiwan’s government published the Adaptation Strategy to Climate Change in Taiwan ([Council for Economic Planning and Development \(CEPD\), 2012](#)). For this work, three expert workshops were conducted in Northern, Central and Southern Taiwan in 2014. With help from the Community Empowering Society (a national NGO), various in-depth interviews and focus group discussions with governmental organizations, local NGOs and local communities were conducted in four counties (Chiayi, Yunlin, Taitung and Hualien County) to work out principles for building resilient cities.

#### **4.1 Integrated urban planning, land use control and urban design**

Policies and strategies related to urban resilience and sustainability must address multiple sectors and dimensions, including land use planning, energy management, ecosystem services, housing and transport, among others

([Kernaghan & da Silva, 2014](#)). Integrated policies and strategies for upgrading public infrastructure can increase resilience across sectors and balance the preservation of local identity with the mitigation and management of risks faced by the city. Proper incentives can facilitate actions and investments toward urban resilience goals ([Arup & Siemens, 2014](#)). Cities can be made less vulnerable to disasters by the deconcentration of key infrastructure services, the reduction of transportation bottlenecks and the provision of more rapid emergency response systems ([Kernaghan & da Silva, 2014](#); [Rose, 2014](#)). Participatory planning resembles the approach toward sustainability because it seeks to integrate social, nonphysical or “soft” dimensions ([Lee, 2014](#)). Furthermore, participatory planning and the development capacity of local authorities must be improved to make resilience against the impacts of climate change a main component of local development plans ([Khailani & Perera, 2013](#))

## 4.2 Governance

Climate has a significant impact on urban areas because they concentrate population, infrastructure, assets and economic activities ([Kernaghan & da Silva, 2014](#); [Khailani & Perera, 2013](#); [United Nations International Strategy for Disaster Reduction \(UNISDR\), 2010](#)). Therefore, cities have become critical focuses of governments that are facing climate change ([Bulkeley, 2010](#); [Jabareen, 2013](#); [Lee, 2014](#); [The Royal Society, 2014](#)). Governance should take a whole-system approach to city management. Governance structures can support a rapid, accurate and decentralized emergency response ([Arup & Siemens, 2014](#)). Coordinating and enabling activities across multiple levels of governance is a critical theme in most city, county and municipality adaptation planning ([Leck & Simon, 2013](#); [Lee, 2015](#); [Bahadur & Tanner, 2014](#)).

## 4.3 Capacity Building

Resilience goes beyond risk mitigation to the building of adaptation capacity ([Jha, Miner, & Stanton-Geddes, 2013](#)). Social systems on various geographical scales must develop their own capacities to respond to the impacts of, and harm caused by, extreme climate change; only by so doing can they build social capacity as part of a long-term adaptation strategy ([Lee, 2014](#)). Additionally, improvements in knowledge and capacity can help city stakeholders plan and design for, and recover from, emergency situations ([Arup & Siemens, 2014](#)).

Not every city, county and municipality has the technical capacity to produce a geospatial description of hazards, harms and social vulnerability. States are responsible for providing technical support for mitigation planning, risk analysis and adaptation planning, but many face the same deficiencies of capacity as the cities, counties and municipalities, as they are unable to specify in detail local mitigation strategies, vulnerabilities and adaptation actions ([Tate et al., 2011](#)). To solve this problem, bottom-up methods that involve all stakeholders can help to clarify the causes of local patterns of vulnerability and to build urban resilience ([Lee, 2014](#)).



#### 4.4 Financing investments

Appropriate financing mechanisms are required to support investments in, and the maintenance of, resilient urban infrastructure. Project appraisal processes should be utilized to elucidate the lifecycle benefits of investments in urban infrastructure ([Arup & Siemens, 2014](#)). Disaster risk financing – the shifting of the economic burden of loss to other sectors, through risk sharing or risk transfer mechanisms such as insurance, should be investigated ([UNEP FI Principles for Sustainable Insurance Initiative, 2014](#)). Additionally, the impact of a natural disaster can be felt long after the event: global economic losses due to natural disasters in 2013 amounted to US\$ 131 billion, or almost 2% of global GDP ([Swiss Re, 2014](#)). In fact, the World Bank has stated that up to US\$ 100 billion annually in climate adaptation financing will be needed in developing countries alone over the next 40 years ([World Economic Forum, 2014](#)). Most guidelines, strategies and plans do not consider funding requirements and sources, but financing remains an uncertain factor in adaptation planning and urban resilience efforts ([Lee, 2015](#)).

#### 4.5 Stakeholder participation

Where local communities are well-informed and able swiftly and effectively to participate in, and shape, local planning processes, they can hold local bodies to account, and their doing so can represent the beginning of a transformative process of social and political change ([Archer et al., 2014](#)). Governments should engage widely with experts, scholars, local NGOs and local communities, and increase the likelihood that additional consequences of climate change are identified ([The Royal Society, 2014](#)). However, small localized stand-alone initiatives are not enough to respond to these challenges ([Reid, H., 2014](#); [Schipper et al., 2014](#)), and stronger engagement with a wider group of stakeholders, particularly governments, provides more opportunities to move away from isolated pilot projects and to integrate community-based adaptation into policy and planning to an extent that NGOs cannot ([Reid, Hannah & Huq, 2014](#)). Moreover, participatory planning and the development capacity of local authorities must be improved to make resilience against disaster a main component of local development plans ([Khailani & Perera, 2013](#)). In short, top-down priorities must be aligned with local-level needs.

Any attempt to build resilience must consider social factors and use local knowledge as well as community and NGO networks to manage and reduce risk ([Jha, Miner, & Stanton-Geddes, 2013](#)). Additionally, institutional adjustment and reformation is the critical basis of implementing eco-spatial governance. Issues related to climate change are cross-disciplinary, cross-sectoral and cross-territorial. Therefore, a transformational, multi-sector, multi-scale and collaborative approach must be taken to efficient governance ([Archer et al., 2014](#); [Crist et al., 2013](#); [Eversole, 2011](#); [Leck & Simon, 2013](#); [Lee, 2015](#); [World Economic Forum, 2014](#)).

### 5. CONCLUSIONS AND SUGGESTIONS

Although the conceptualization and operational definition of resilience vary among disciplines (as discussed in, for example, [Taubenböck & Geiß,](#)

2014)), the broad underlying concept is overcoming adversity ([Buikstra et al., 2010](#)). The literature elucidates three attributes of resilience, which are (a) recovery, which is the capacity to recover from an adverse event and return to the original state; (b) stability, which is the capacity to cope with adverse changes with minimal disruption, and (c) transformability, which is the capacity to adapt to changing conditions ([Dhakal, 2015](#)). The third attribute, transformative resilience, is particularly important in organizational systems ([Edson, 2012](#)). Transformation can involve a long-term shift or occur swiftly in response to a triggering event. Like adaptation, transformation can be negative (unintended) and positive (proactive). In general, the focal point is on positive adaptation and transformation ([The Royal Society, 2014](#)).

Improving resilience involves integrated actions and responsibilities at local, national and international levels, by the public and private sectors, local communities and NGOs ([The Royal Society, 2014](#)), which have the potential to restructure economic, social, and political institutions. Briefly, urban climate-focused governance remains an emerging climate change adaptation planning dimension ([Archer et al., 2014](#)). Experience has demonstrated that community-based adaptation can remain centered on the priorities and processes that are selected by community without all adaptations' having necessarily to be implemented at the level of the community ([Reid, H, 2014](#); [Schipper et al., 2014](#)).

Although inclusive, integrated and deliberative methods of urban climate governance are preferred, in practice their implementation is constrained by capacity gaps, power relations, and political struggles, which may limit the transformative potential of such methods in an urban context ([Archer et al., 2014](#)). However, coordinating and enabling the actions of multiple stakeholders provides opportunities for effective urban climate governance ([Leck & Simon, 2013](#); [Lee, 2015](#); [Bahadur & Tanner, 2014](#)). Additionally, a robust top-level policy structure is essential to shaping the mainstreaming of community-based adaptation into local- and national-level planning and design ([Archer et al., 2014](#); [Council for Economic Planning and Development \(CEPD\), 2012](#)).

Resilience-building is a relatively new area of activity for cities ([Anguelovski & Carmin, 2011](#); [Archer et al., 2014](#)). An ongoing process involves the use of new information and evaluation of existing measures to update regularly resilience-related plans and decisions ([The Royal Society, 2014](#)). However, no "one-size-fits-all" solution exists, and relevant action must be context-specific. Planning activities must take into account local priorities, which may not be climate change, and so integrate adaptation into the prevailing development paradigm ([Council for Economic Planning and Development \(CEPD\), 2012](#)). Furthermore, authorities must clearly understand the relationship between the vulnerability of local administrative regions to climate change-induced disasters and the resilience of those areas against such disasters ([Jabareen, 2013](#); [Khailani & Perera, 2013](#); [Lee, 2014](#)).

Building adaptive capacity both increases resilience and reduces vulnerability to many hazards ([Lee, 2015](#)). Broad responses to climate change in Taiwan, such as those aimed at urban resilience seem to be more open to participation and contributions from numerous stakeholders on various geographical scales. In 2012, the government of Taiwan set the national adaptation policy. Since then, cities, counties and municipalities had drafted plans to adapt locally to climate change. However, no community-based adaptation policies, plans or actions have been proposed. Building a resilient society requires top-down policy guidelines from the government,

bottom-up community empowerment and the participation of local communities. In the near future, the focus should be on helping communities to develop the principles that will govern their adaptation strategies and related guidelines, and, further, to implement them. Only by so doing can a resilient society be realized.

Although the city's needs can be met through community empowerment to build sustainability, resilience and adaptability, the community level cannot grasp the enough power, resources needed are very limited, and locality and characteristics of each community are so diverse. Moreover, the planning systems and implementation mechanisms of Taiwan, Asian, European and American countries are not similar, how to obtain effective results is very complicated and difficult and therefore warrants further in-depth analyses.

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