Analyzing the Sustainable Rural Cities Program

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About Us

We are a group of fourteen graduate students from the fields of regional planning, public policy, industrial and labor relations, and international development. Our backgrounds range from architecture to finance, transportation planning, and journalism. We come from a variety of countries, including Canada, Japan, Pakistan, and the United States of America.

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Acronyms

CIEPAC	The Economic and Political Investigation Center of Community Action
IMT	Intermediate Modes of Transportation
LEED	Leadership in Energy and Environmental Design
MDGs	Millennium Development Goals
NGOs	Non-governmental organizations
PND	The Mexican Federal Development Plan 2007-2012
SDPC	The Solidarity Development Plan of Chiapas
SRC	The Sustainable Rural Cities program
UN	The United Nations
UNESCAP	The United Nations Economic and Social Commission for Asia and the Pacific
USD	United States dollar

Executive Summary

As students in a workshop in the Department of City and Regional Planning at Cornell University, we conducted an evaluation of the Sustainable Rural Cities (SRC) program in Chiapas, Mexico, to determine the extent to which the SRC program's new rural cities have the necessary components for accomplishing long-term sustainability, predominantly through effective community participation.

Our research focuses on the existing projects under SRC, including Nuevo Juan del Grijalva and Santiago el Pinar. We relied on site visits; interviews; relevant policy, planning, and development literature; and official documents regarding the program to further our analysis of SRC. During our fieldwork, we interviewed local stakeholders, government officials, project leaders, academics, and non-governmental organizations (NGOs) familiar with the program. We also interviewed in-house professionals and academics at Cornell University to gain a better understanding of the concepts detailed in our report.

SRC creates new towns in order to curb the negative effects of dispersion in the region. By creating new towns—or "rural cities" and "rural villages"—the program aims at consolidating services and resources for otherwise dispersed rural populations and those at risk of environmental disaster. The program's approach therefore resembles the "New Town" framework within the field of planning. Although there are several potential benefits that this model can offer to societies, it can also impose burdens on particular groups. Oftentimes, citizens are forced to relocate to new locations. SRC residents may experience difficulty transitioning from rural agrarian life to the program's new settings, as well as learning a new trade with little to no training. In order to mitigate these concerns and create sustainable settlements that will endure the test of time and meet the program's goals, it is important for program implementers to incorporate ideas of sustainability and citizen participation into the planning and implementation process. Successful execution of participatory, sustainable planning can improve the likeliness that the program will be an effective and lasting solution to the problems facing Chiapas. Therefore, our report often refers to the concepts of sustainability and participatory planning as two pillars for accomplishing a successful and long-lasting program.

Although SRC offers a great deal of promise in advancing access to basic services such as health care and education to these communities, our overall conclusion is that the program does not appear to have the elements required for long-term sustainability, or the ability to include voices of stakeholders in the planning and implementation process. These elements were most lacking in the infrastructure and economic productive projects of the new communities. Further, while access to basic services as well as health care and education seem to be SRC's greatest strength, concerns about the services remain, including their quality, continuity, and affordability.

Infrastructure

The goal of SRC is to build "cities of the future", providing not just an efficient method of delivery of basic services, but also an opportunity for the provision of improved housing and urban design. However, during our site visit to Chiapas, we identified several concerns about the safety,

efficiency, and implementation of the infrastructure in Nuevo Juan del Grijalva and Santiago el Pinar. There are a number of opportunities for cost-reduction and more efficient construction that should be considered. In addition to their potential to lower the costs of the program, these measures would improve the quality of the construction, which is key since residents' confidence in the quality of housing is essential to the sustainability of SRC. As it stands, too many of the residents we interviewed had serious doubts about the quality of the construction of the new cities and houses under SRC. In addition, mechanisms for residents to file complaints and actively participate in improving their situation are not in place. For reasons discussed in this report, until these problems are addressed, the sustainability of SRC is uncertain.

Economic Viability

The economic viability of SRC is essential to ensuring its long-term sustainability. In terms of the program's economic development strategies, we examined the productive projects offered through the program, as well as the opportunities for employment. These findings were isolated to Nuevo Juan del Grijalva, as the productive projects in Santiago el Pinar are not yet fully established. We found that the productive projects were ineffective at providing a stable source of income for families and that there was a disconnect between the residents' expectations and those of the designers of the program regarding the residents' capacity to generate income. The lack of success of these projects is not a consequence of any character flaw in the residents of Nuevo Juan del Grijalva. Rather, the issue lies in the underlying structural flaws of the productive projects. Broader participation in the setup and selection of projects would improve their chances of sustainability, as residents' local knowledge and skill sets would be better used.

We also determined that the lack of local consumer market and isolation from robust markets elsewhere serve as major limitations to the success of the program. There are alternatives to building standalone cities, such as the ones under SRC, including strengthening pre-existing centers and supplementing the program with improved rural development programs. Greater participation and an emphasis on regional economic growth would help communities flourish regardless of whether one chooses an export-led model of growth or a local consumption model.

Basic Services and Additional Considerations

The SRC program is a notable improvement for most stakeholders in that it provides access to basic services like water, sanitation, and electricity, as well as health care and education. In fact, residents identified health care and education as two of the strongest aspects of the program. However, there are concerns that need to be addressed about the provision of services. In particular, residents worry about service continuity, affordability, quality, and access. The delivery of services could be improved through an effective participatory approach to information gathering and implementation and evaluation of services. A participatory approach would also help to ensure that health care and education needs are met. More information about the electricity billing system and mechanisms of participation would allow residents to understand the functioning of their new utilities but also address complaints about their affordability. Lastly, improving transportation services will improve not only residents' quality of life but also contribute to the economic success of the rural city. Public services are essential to the success of any city. However, close attention must be paid to the effectiveness of these services for the

population being served.

The results of our study show that SRC has advanced health care and educational services in the new rural cities. However, despite advances in these areas, we do not believe the program has the elements necessary for sustainability in the long-term. We have identified several key areas where the program could be improved in order to ensure its relevance in the long-term. Ultimately, we found that SRC will not meet the goal of alleviating population dispersion in Chiapas and protecting those at risk of natural disasters. Therefore, we recommend that alternative forms of development be fostered, including a strengthening of those already-established urban centers and the development of a strong rural development policy. We believe these would more effectively meet the SRC's stated goals while also being more cost-effective.

Introduction

Purpose

In 2007, the state government of Chiapas launched the Sustainable Rural Cities (SRC) program with two main objectives – first, to help prevent population dispersion by reorganizing the territory into compact settlements, and second, to alleviate rural poverty in the state. By creating concentrated cities or villages and increasing population density, the state seeks to create greater efficiency in providing basic services and infrastructure for otherwise dispersed populations.[1]

The purpose of this report is to examine components of SRC that relate specifically to the program's ability to generate sustainable rural settlements. The report proposes criteria necessary for creating viable and long-lasting settlements under the program. These criteria will determine the extent to which the new rural cities under SRC have the necessary components for accomplishing long-term sustainability, predominantly through effective community participation.

Findings

Although SRC offers a great deal of promise in advancing access to basic services as well as health care and education in the region, our overall conclusion is that the program does not appear to have the elements required for long-term sustainability, or a mechanism to include the voices of local residents and other stakeholders in the planning and implementation process. There are three major concerns. First, the program is confronted with several issues relating to the infrastructure and physical design of the new cities. Inadequate building materials and design standards call into question the long-term viability of the new settlements. Second, the program also faces difficulties in establishing new businesses and creating jobs for residents, which are vital components of a well-functioning new city. These challenges are exacerbated by the lack of access to outside markets that would otherwise help to generate income for residents. Finally, basic service provisions including health care, education, and basic utilities should be improved to increase the likelihood that the rural cities will succeed. Our report will discuss each of these main concerns individually, bearing in mind the sensitive nature of relocating people to new places and the essential role of citizen participation in planning and sustaining new cities.

Methodology

The primary objective of our research is to evaluate the sustainability of SRC with a particular emphasis on the program's impacts on economic and human development. Thus, our study does not provide a comprehensive evaluation of SRC, but rather focuses on the infrastructure, economic viability, and basic services of the newly created cities. Our analysis includes information from site visits, interviews with experts familiar with the concepts outlined in our report and issues directly relating to SRC, as well as relevant policy, planning, and development literature. Our research focuses on the existing projects under SRC, with suggestions for potential

1. Chiapas State Government, "Gestión Ambiental y Desarrollo Sustentable" In *Chiapas State Annual Report* (2009): 337-338.

improvements in the design and implementation of future efforts.

Our site visits to Nuevo Juan del Grijalva and Santiago el Pinar allowed us to observe the SRC program firsthand. During our fieldwork, we interviewed local stakeholders, government officials, project leaders, academics, and non-governmental organizations (NGOs) familiar with the program. We also conducted interviews throughout October and November 2010 by phone, email, and videoconference. We followed a general outline for interviewing, but interviews were left open-ended and loosely structured, allowing the interviewees to share what information they considered important. Unless otherwise noted, interviews have been conducted anonymously. We also relied on a number of government sources, NGO publications, and other secondary sources to inform our research.

With specific regard to the section on infrastructure, we relied on information obtained from on-site observations, master plans, interviews with people involved in the project, and consultations with outside experts, including a LEED certified architect familiar with sustainable building practices.[2] We evaluated the infrastructure of the cities in terms of the materials used to construct the new settlements and the physical design. To complement this research, we also examined the requirements for maintaining public infrastructure.

For the section on economic viability, we gained information about the local economy of Nuevo Juan del Grijalva through interviews with community members, business owners, and NGOs. Because of concerns expressed by many residents regarding the productive projects, we chose to highlight the issues with production and employment within Nuevo Juan del Grijalva. The productive projects were not fully functional in Santiago el Pinar at the time of our visit, so we were unable to assess that city's productive capacity. In addition to our site observations and interviews, we also reference literature on local and regional economic growth and development, cooperatives, and participatory approaches to economic development to complete our analysis of the economic viability of the SRC projects.

Finally, in the section on basic services and additional considerations, we analyze SRC's health care facilities and schools based on input from local citizens and NGOs working on issues related to the project, and we rely on our site visit observations to detail the program's shortcomings in terms of service provisions. Through an analysis of relevant literature on best practices, we suggest areas that should be taken into consideration to improve the delivery of these basic services.

Organization of the Report

This report is divided into four sections. The first section provides an analytical framework for evaluating SRC by first explaining the rationale behind new town planning, a model that SRC closely resembles. This section then delves into the concepts of sustainability and citizen participation, which are integral for the long-term success of the program. The second section discusses the infrastructure of the newly created cities, focusing on the physical design, materials

2. Leadership in Energy and Environmental Design (LEED) is an internationally recognized green building certification system.

used to construct the homes, and requirements for maintaining public infrastructure. The third section outlines SRC's strategies for economic development and analyzes its ability to provide employment and productive projects for residents. In addition, it provides an explanation for why SRC's economic development strategy may falter – because the new cities lack a viable consumer market. The fourth section discusses the difficulties SRC faces in terms of delivering basic services to residents. This section focuses on health care, education, transportation, as well as the affordability of and access to public services and utilities. Throughout the report, we offer suggestions for how the program can be improved and conclude with a summary of our findings.

Analytical Framework

SRC relies on fabricating new human settlements to concentrate residents, making it easier to provide basic services and resources to otherwise-dispersed populations, including those at risk of environmental disasters. Although there are several potential benefits to this model, it is not without drawbacks or negative effects. While a lot of development projects offer great benefits to entire societies, they can impose burdens on particular groups. Commonly, citizens are forced to relocate to newly manufactured locations such as the communities created under SRC.[1] New SRC residents may experience difficulty transitioning from rural agrarian lives to these new settings, including learning a new trade with little to no training. In order to mitigate these drawbacks and create sustainable settlements that will endure the test of time and meet the program's goals, it is important for program implementers to incorporate both ideas of sustainability and citizen participation into the planning and implementation process. Successful execution of participatory, sustainable planning can improve the likeliness that the program will be an effective and lasting solution to the problems facing Chiapas. Therefore, the two pillars of our report are sustainability and participatory planning. This section discusses the theories behind these concepts in greater detail after briefly contextualizing the implications of creating new towns.

New Town Planning

To meet the program's goals of alleviating population dispersion in Chiapas, SRC relocates residents to fabricated rural settlements. This approach closely resembles the new town planning model, a strategy used to curb the negative effects of population concentration, more traditionally, and population dispersion, more recently. In developing countries, these planned communities are generally intended to serve as regional growth poles, helping to deflect migration and ease the demographic pressures on larger, more concentrated cities suffering from lack of job opportunities and chronic underemployment.[2] A number of successful new towns have been located near well-established large towns and cities, allowing the new settlements to link into existing economies and infrastructure.[3] Urban development theorist Jane Jacobs argues that well-established cities already have the versatility to support the necessary foundation for new jobs in a new city.[4] Furthermore, pre-existing city markets are both diverse and densely populated; two qualities that make it economically feasible to produce goods and services locally, and are not necessarily found in "rural places, company towns, or little market towns."[5] The new towns under SRC are not located in areas where they can easily integrate with existing markets and resources of larger cities. Instead, it would appear that SRC utilizes the new town model to

1. Mike Jenks and Rod Burgess, *Compact Cities: Sustainable Urban Forms for Developing Countries* (London: E & FN Spon, 2000), 179.
2. Ibid., 47.
3. Dona J. Stewart, "Cities in the Desert: The Egyptian New Town-Program," *Annals of the Association of American Geographers* 86, no. 3 (1996): 459-80 and the International Bank for Reconstruction and Development, "Reshaping Economic Geography," *World Development Report* (2009): 224.
4. Jane Jacobs, "Cities and the Wealth of Nations: A New Theory of Economic Life." in *Political Arrangements: Power and the City*, ed. Henri Lustiger-Thaler (Montreal: Black Rose Books Ltd., 1992): 11.
5. Jacobs, 11.

consolidate services and resources for otherwise dispersed rural populations with no explicit intent of establishing new growth poles throughout Chiapas.[6] Because the new settlements under SRC are not located near a larger, well-established city and do not seem intended to serve as growth poles, their success in terms of long-term sustainability may be limited.

Like many new town initiatives, SRC requires residents to relocate from their original communities to newly created settlements. The process of relocation can be a harrowing experience for many people. Those affected are uprooted from their homes, often lose their established social networks, and are placed in a situation where it can be difficult to create new ones.[7] Additionally, studies suggest that improper relocation efforts can result in a number of negative outcomes such as joblessness, loss of access to common property used for productive activities (such as communal land), food insecurity, and economic and social marginalization.[8] Relocation is especially problematic when citizens are involuntarily moved, or when they are not given the opportunity to effectively participate in the process leading to their relocation (see Appendix A: Participatory Planning). It can lead to increased poverty amongst relocated people, the disintegration of social and cultural networks, and psychological stresses,

Box 1: Community Relocation, Transparency, and Inclusion

Relocating communities is a controversial topic. Two key issues that can make the difference between successful versus faulty relocation projects are community inclusion and transparency.[1] Studies suggest that relocation projects that lack citizen participation and transparency can potentially raise the level of impoverishment among relocated people, or lead to the disintegration of social and cultural networks and serious psychological stresses.[2] Empirical evidence shows that reducing residents' political, economic, and social control can destroy their sense of community, adversely impacting their culture, economy, and health.[3]

Relocation projects that promote inclusion and transparency allow residents to be integral members of the process. When included, residents can provide their opinions, perspectives, and suggestions, which can prevent faulty strategies from being implemented. This ethos is also constructive because it shows residents that project leaders value their input. Evidence shows that relocation projects can yield favorable outcomes when the process is inclusive and transparent, and consequently relocated residents can feel integrated into the new community.[4]

1. Orit Tamir. "Assessing the Success and Failure of Navajo Relocation." Human Organization 59, no. 2 (Summer 2000): 267.

2. Andrew Gray. "Indigenous Resistance to Involuntary Relocation." Understanding Impoverishment: The Consequences of Development-induced Displacement. edited by Sam Thangaraj. (Berghahn Books 1996), 106 and 99.

3. Deanna M. Kingston and Elizabeth Mario. "Twice Removed: King Islanders' Experience of "Community" through Two Relocations." Human Organization 69, no. 2 (Summer 2010): 119.

4. William M Rohe and Scott Mouw. "The Politics of Relocation: The Moving of the Crest Street Community." American Planning Association 57, no. 1 (Winter 1991): 57.

6. As far as we know the Chiapas government is not implementing a growth poles strategy under the framework of the SRC program. Chiapas State Government, 337-338.

7. Jenks, 179.

8. Lynn Magdol, "Is Moving Gendered? The Effects of Residential Mobility on the Psychological Well-being of Men and Women" *Sex Roles* 47, no. 11. (2002): 557 and Sam Thangaraj. "'Impoverishment Risks' Analysis: A Methodological Tool for Participatory Resettlement Planning." in *Understanding Impoverishment: The Consequences of Development-induced Displacement*, ed. Christopher McDowell (Oxford: Berghahn Books 1996), 225-230.

even when the purpose of relocation is to raise standards of living.[9] (See Box 1).

Upon relocation, adapting to a new environment can be especially difficult for indigenous populations such as those found in Chiapas. These communities are frequently located in isolated areas with strong and sacred ties to their language, territories, and culture. Relocation can be a traumatic experience, posing a threat to their way of life. Furthermore, indigenous populations are often impoverished and marginalized, with a limited number of coping strategies to adjust to changes in their environment.[10]

Whenever new communities are planned, it is important to consider the potential risks and unintended consequences of relocation in order to determine whether the benefits of relocation actually outweigh the costs. It is especially important to consider the level of citizen participation that took place, because this can greatly determine the outcome of the planned community. In Chiapas, relocated residents were granted conditional land titles through SRC, which stipulate that they must inhabit their new homes for 25 years.[11] During this time, they are not allowed to rent or sell their houses. Additionally, many relocated residents continue to use their original property in the communities from which they came for productive activities and therefore bear additional costs for owning, maintaining, and traveling to that land.[12] This inflexibility in terms of land titles and home ownership can be difficult and costly for residents, heightening their dissatisfaction with the process of relocation. Through our interviews, we found that a number of local residents would like to return to their original land, but are willing to stay because they have access to social services such as schools that would not otherwise be available to them. Despite these incentives to remain in the new cities, the fact remains that many residents are dissatisfied with being relocated and this may ultimately impact their willingness to stay. It is also telling that the first SRC city, Nuevo Juan del Grijalva, provided homes for people displaced by a flood. Their willingness to relocate may have largely been predicated on the fact that they had already lost their homes and were living in refugee camps. However, not all potential residents of the new rural cities will be displaced victims of natural disasters, and their sentiments about being relocated may be very different from those of Nuevo Juan del Grijalva residents. Despite certain advantages, the relocation aspect of SRC is not universally popular, particularly given the historical mistrust of government in Chiapas.

Sustainability

Narrowing our definition of sustainable development is the first step to determining whether SRC's sustainability goals have been met. By strengthening our understanding of sustainable development, we can begin to formulate baseline criteria for measuring the success of the program. The concept of sustainable development gained international recognition in 1987,

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9. Andrew Gray. "Indigenous Resistance to Involuntary Relocation." in *Understanding Impoverishment: The Consequences of Development-induced Displacement*, ed. Christopher McDowell (Oxford: Berghahn Books 1996), 99.

10. Christopher Barrett, "Food Security and Food Assistance Programs." in the *Handbook of Agricultural Economics,* ed. B.L. Gardner & G.C. Rausser (Amsterdam: North-Holland, 2002): 2132.

11. Chiapas State Government, 342.

12. Ibid.

after the publication of Our Common Future (known today as the Brundtland Report) by the United Nations World Commission on Environment and Development.[13] This document defines sustainable development in terms of its ability to reconcile environmental and human development needs, while simultaneously meeting the needs of present and future generations.[14] Today, this long-term outlook is a cornerstone of achieving sustainable development, and it is one that program implementers should strongly consider in order to ensure SRC's success. Since the Brundtland Report was published, it has generally been understood that sustainable development should utilize resources within environmental constraints, be equitable, promote social justice, and utilize inclusive decision-making procedures.[15]

The relationship between sustainability and urban form can greatly impact how cities are developed by influencing the availability of resources, as well as the social and economic well-being of these places.[16] One way that sustainable development can influence urban form is by creating compact settlements, as evidenced by the cities created through SRC.[17] Advocates for compact cities argue that concentration is an important component of a sustainable future. They argue that compacting cities can help reduce strains on the environment and improve social and economic conditions by supporting local businesses and services and promoting greater social equity.[18] These rationales for compaction provide a useful starting point for evaluating the Sustainable Rural Cities program and can serve as guidelines for determining whether its sustainability goals have been reached.

The idea of sustainability under SRC is that the new rural cities will eventually consolidate into urban centers with minimal support from the government and successfully retain residents within the new communities.[19] For the purpose of this report, our analysis focuses mainly on the social and economic aspects of sustainability as a way of determining whether these settlements can subsist over time. However, we suggest that expanding the notion of sustainability to also include environmental concerns is necessary to comprehend the wide scope of sustainable development. By incorporating environmental concerns into the planning and implementation process, the Sustainable Rural Cities program can better position itself to make efficient and responsible use of natural resources as well as capitalize on the opportunity to become a model program for sustainable development efforts across the developing world.

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13. William M. Lafferty and Oluf Langhelle, Towards Sustainable Development: On the Goals of Development and the Conditions of Sustainability (New York: St. Martin's Press, 1999), vii.

14. World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987), 8.

15. Mike Jenks, "Sustainable Urban Form in Developing Countries?," in *Compact Cities: Sustainable Urban Forms for Developing* Countries, ed. Mike Jenks and Rod Burgess (London: E & FN Spon, 2000), 3.

16. Mike Jenks, Elizabeth Burton and Katie Williams, *The Compact City: A Sustainable Urban Form?* (London: E & FN Spon, 1996), 11.

17. Katie Williams, Elizabeth Burton, and Mike Jenks, *Achieving Sustainable Urban Form* (London: E & FN Spon, 2000), 1.

18. Jenks, et al., The Compact City: A Sustainable Urban Form?, 99.

19. This is the definition of sustainability that Elías Rangel Ochoa and his collaborators stated in the "Letter of Intent", Social Policy Office of the President, Mexico (22 September 2010): 1-2.

Participatory Planning

Citizen participation is an important part of creating new communities that must be further unpacked in order to fully understand its benefits. Allowing citizens to participate in every step of the community building process, including the planning, implementation, monitoring, and evaluation stages, enables diverse groups to engage in a dialogue leading to decisions that are mutually beneficial for everyone.[20] Additionally, participation enables local knowledge to be utilized to ensure a more equitable allocation of benefits to community members.[21] Encouraging participation in the development of a project can also strengthen social capital and networks between residents and other stakeholders, which are necessary for a well-functioning community.[22] It also helps groups fulfill their collective needs by emphasizing the importance of accommodating various interests and giving equal weight to community members' needs.[23]

Effective citizen participation must meet certain criteria in order for it to deliver benefits. First, it must provide an arena where people who are not accustomed to articulating their concerns can do so. This is particularly important for marginalized populations who may not already have the skills, capacity, or confidence to engage in this process.[24] Second, participation is not costless, and people may not be willing to participate actively unless they perceive the potential gains of participating as outweighing the costs. Therefore, citizens should be provided with appropriate incentives to partake in the process of planning for a new city. Incentives must be described in concrete rather than abstract terms in order to ensure citizens understand the benefits of participation. They may be more inclined to participate if they can identify a tangible problem that is important in their everyday lives.[25] Finally, participation should consider the asymmetrical power structures of unequal societies. Where there are large power differences between groups in a society, it is very likely that the dominant groups will use participation as a tool to further their own interests. Thus, the participatory process should bring to light these inequities and ensure that every stakeholder's voice is heard.[26] (See Appendix A: Participatory Planning).

The contentious relationship between the government and citizens of Chiapas has led to a history of participation that is wrought with challenges, hindering development and a tradition of good governance in the region. Because of the state's economic inequalities, ethnically polarized

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20. Siddiqur R. Osmani. "Participatory Governance: An Overview of Issues and Evidence," in *Participatory Governance and the Millennium Development Goals* (New York: United Nations Economic and Social Affairs, 2008), 1 and Keith Brown, *Transacting Transition: The Micropolitics of Democracy Assistance in the Former Yugoslavia* (Bloomfield: Kumarian Press, 2006), 38.
21. Ibid., 4.
22. Ibid., 1.
23. John Forester. Planning and Mediation, Participation and Posturing: What's a Deliberative Practitioner to do? (UNC, UW Lecture 2004), 3 and Harry Blair "Innovations in Participatory Local Governance," in Participatory Governance and the Millennium Development Goals (New York: United Nations Economic and Social Affairs, 2008), 82.
24. Osmani, 28.
25. Osmani, 30. and Pierre Clavel, Interview by Nancy Ferguson, 12 October 2010, transcript, Department of City and Regional Planning, Cornell University.
26. Osmani, 30.

social structure, and lack of effective solutions via political channels, citizens have historically not trusted the democratic process to redress their grievances.[27] In order for it to be effective, SRC must provide a forum for residents of the new cities to fully embrace and participate in the program, keeping in mind the historical conflicts between Chiapas citizens and the government.

With these challenges to development in mind, community participation has been included in many government programs and projects in Mexico since the 1990s.[28] The Mexican Federal Development Plan 2007-2012 (PND) ensures that "Mexicans have real opportunities to fully exercise their rights as citizens and to participate actively in the political, cultural, economic and social development of their communities and country."[29] This objective has been duly noted under the Solidarity Development Plan of Chiapas (SDPC) for years 2007-2012, which details the state's goals to provide awareness campaigns promoting "the culture of transparency and accountability," and to create stronger ties between society and government.[30]

The Chiapas state government has recognized the importance of collective participation in implementing the SRC program, presenting it as one of the state's best attempts at combating poverty in the region. The state argues rightly that the participatory process helps improve the accuracy of its public policy, and has created the Citizens Police Development and Neighborhood Assemblies to hastily resolve security problems and empower citizens to prioritize and enforce the provision of projects.[31] However, despite the stated emphasis on citizen participation, we identified several gaps in the participatory process in the program's implementation in the newly created cities. During the interview process several interviewees stated their overall distrust for the government. Moreover, various conversations yielded complaints about the lack of understanding for political processes that directly affects them. The apparent disconnect between the residents of the SRC and the government stated interest in participation illustrates a shortcoming of the goals set forth by the latter.

Along with overall confusion of the political process, interviewees gave mixed responses to the question of legally binding restrictions, which they entered upon taking residence in the SRC. It is evident that the legal complexities associated with deeds and their respective restrictions can cause confusion amongst people without prior experience to these items. The need for thorough understanding and effective communication between the public and government entities is vital to a healthy interaction between the two. The leaders of SRC should alter their development plan for existing and future SRCs so that it is more in line with the goals to promote transparency and accountability, and create stronger ties between citizens and government in the state's current

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27. Raúl Benítez Manaut, Andrew Selee, and Cynthia Arnson, "Frozen Negotiations: The Peace Process in Chiapas," *Mexican Studies 22* No. 1 (2006): 132.

28. National Development Plan 1995-2000.

29. Presidencia de la Republica Mexico, "Objectivos Nacionales", Plan Nacional de Desarrollo, http://pnd.calderon.presidencia.gob.mx/desarrollo-humano/anexo-prueba2.html (accessed 5 November 2010).

30. Plan Nacional de Desarollo, "Gobierno de Unidad y Promotor do la Democracia Participativa," Chiapas Solidario, http://www.chiapas.gob.mx/media/plan/EJE1.pdf (accessed 10 November 2010).

31. Chiapas State Government , 347-348 and Chiapas State Government, "Policía Ciudadano Solidario," El Portal de Chiapas , http://www.chiapas.gob.mx/policia-ciudadano and "Asambleas de Barrio)." El Portal de Chiapas, http://www.chiapas.gob. mx/asambleas-barrios (accessed 9 November 2010).

Solidarity Development Plan. These issues are further discussed in the following sections, but it is important to emphasize that, while the government has claimed to include participation in the program's implementation, in-depth citizen involvement has been lacking.

Infrastructure

The Sustainable Rural Cities program is touted as building cities of the future, providing not just a method of provision for basic services, but also an opportunity for access to improved housing and urban design. In this section, we assess the design elements within housing and larger urban design decisions in Nuevo Juan del Grijalva and Santiago el Pinar. To complete this analysis, we have relied on personal site observations and best practices literature, supplemented by the guidance and expertise of a licensed architect. With respect to housing design, our analysis is based on the physical integrity of the structure and the comfort of those living within it. Specifically, we discuss concerns related to observed problems with the roof, ventilation, envelope, topography and foundation, water management, and appliances in SRC houses.

The literature on housing policy, planning and design addresses both the physical structure of the house as well as its relations to other houses, communities, and social and political structures.[1] Thus, the term "housing" has been defined to be a broader field of social organization. Governments must recognize that a housing program cannot be disassociated from its environment or urban design. The lives of the inhabitants are not merely confined to the interior of the houses but are also affected by physical surroundings and social and public services. A successful housing program must be multi-faceted in its outlook, taking into consideration urban design, housing structure and materials, as well as infrastructure maintenance in order to achieve economic and social sustainability.

Nuevo Juan del Grijalva

Nuevo Juan del Grijalva, the flagship and inaugural city of SRC, was the primary location for our interviews and observations regarding infrastructure and physical design. We identified several concerns from our visit to Nuevo Juan del Grijalva, including the lack of a transparent, inclusionary process of planning, the use of materials that are not up to ecological or best practice industry standards, and the poor execution of construction and planning.

Urban Design

In Nuevo Juan del Grijalva, interviews with residents revealed that well-meaning urban design initiatives did not always fully meet perceived needs. Being attuned to citizen sentiment

Figure 1: Productive backyards in Nuevo Juan del Grijalva.

1. Eugene Henry Klaber, *Housing Design* (New York: Reinhold Publishing Corporation, 1954), 11.

can inform planners of outstanding issues that can be addressed to improve the long-term sustainability of the city, and can be better-anticipated in the construction of future cities.

Participatory urban design is critical, because the residents of a planned community are best-positioned to notice any issues first. For example, citizens in Nuevo Juan del Grijalva enjoyed public infrastructure like safe sidewalks, good lighting, and public recreation amenities, but space in the city was not allocated as residents may have preferred. Citizens expressed a desire for larger homes, and many felt they were unable to produce food, despite the presence of the productive backyards.[2] This may be due to the relatively small size of the backyards.

On the other hand, we observed very wide and ubiquitous roads, like those commonly seen in automobile-focused suburbs. These are not particularly useful to a population that has little need for automobile infrastructure, as few residents use or own cars. Though program implementers originally considered public transportation for Nuevo Juan del Grijalva and constructed a bus bay, it is not in use. Ultimately, the idea was not executed and the town lacks regular public transportation service.[3] A formalized mechanism for citizens to help create planning policy, as well as provide feedback on a continual basis, can foster a sense of ownership and encourage residents to remain in the city, while improving the plans of future cities.

The planning process for the provision of public utilities should be linked to the entire infrastructure planning process and therefore be integrated within the overall master plan of the city. This is especially important in a greenfield construction process, such as the SRC program, where the lack of any previous construction on the site increases the importance of linking municipalities, utility companies, housing agencies and construction companies.[4] Although officials were unable to provide us with an individual master plan for Nuevo Juan del Grijalva, an example of an element where this linkage was absent was the flooding of streets from rain water. Storm drains had not been built during the initial planning and development phase. Rather, they are planned for next year, a step that should have been part of the initial site planning and implementation process.[5] In addition to the dangers of flooding to residents and their property, it is important to note that this reactionary planning strategy does not follow best planning practices, particularly for greenfield construction.[6] Adding drainage after constructing the rest of the city infrastructure means that previous work on roads must be redone and greatly increases the costs to Nuevo Juan del Grijalva. This should be corrected in future construction plans.

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2. Anonymous in Nuevo Juan del Grijalva. Interview by Glenn Garcia and Martin Romo, 9 October 2010, transcript, Department of City and Regional Planning, Cornell University.
3. Anonymous. Interview by Martin Romo, 5 November 2010, transcript, Department of City and Regional Planning, Cornell University.
4. Alexandra Ortiz, "Urban Service Delivery and the Poor: The Case of Three Central American Cities." *World Bank Report No. 22590* (2002): 27.
5. Anonymous. Interview by Marcela González Rivas, 10 October 2010, transcript, Department of City and Regional Planning, Cornell University.
6. Interview with LEED Certified Architect. Interview by Glenn Garcia, 10 October 2010, transcript, Department of City and Regional Planning, Cornell University.

Roof

There was much confusion over the materials that made up the roof of the housing units in Nuevo Juan del Grijalva, but it did not appear that the optimal material was in use. It was reported that the roofs of Nuevo Juan del Grijalva are "sandwiches" consisting of a layer of asbestos, styrofoam and another asbestos layer.[7] (See Box 2). Other sources reported different materials, and an official list of materials used was unavailable, leaving the roof composition uncertain. It is worth mentioning that the health risks of asbestos as a building material are well documented, and its use as roofing is a serious concern.[8]

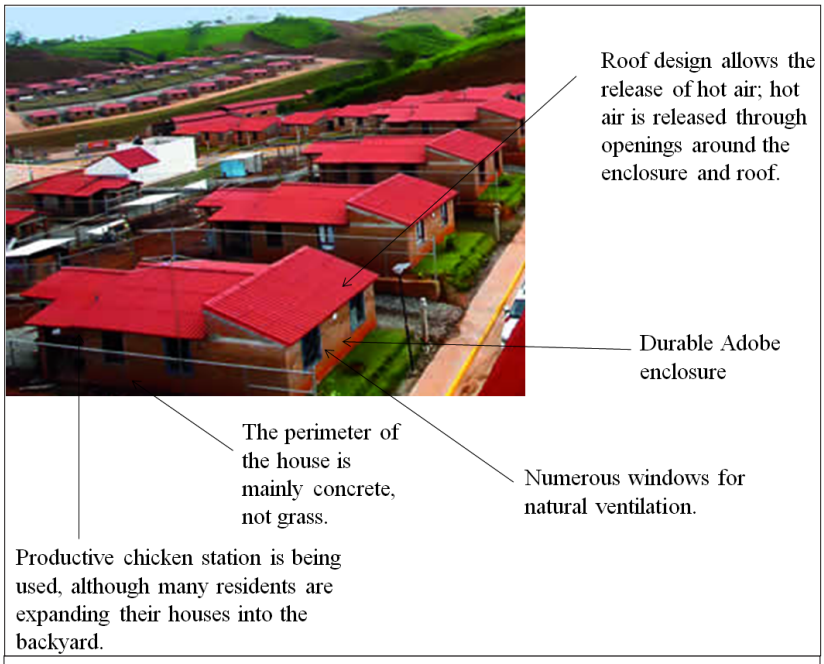

Figure 2: House in Nuevo juan del Grijalva labeled to display the issues discussed in this report.

Ventilation

Because of the warm climate of Chiapas, it is crucial that houses are constructed with proper ventilation, which is necessary for comfort and to avoid condensation.[9] The houses at Nuevo Juan del Grijalva do not have physical vents, rather, there are gaps between the roof and walls to release the hot air (see Figure 2 above). As long as the temperature outside is cooler than the interior temperature, the simplest method to cool the home is through natural ventilation, or opening a window.[10] When air heats, it rises, permitting the cooler air to remain on the ground level. This air circulation process has been used within housing design consisting of high sections, where the warm air is vented at the top of the space (See Figure 14 in Appendix C: Housing Design).[11] This is best practice and should be considered in future construction.

Renewable Energy: Biomass vs. Biogas

The design of Nuevo Juan del Grijalva originally proposed biogas stoves and energy for houses.

7. Anonymous. Interview by Marcela González Rivas, 10 October 2010, transcript, Department of City and Regional Planning, Cornell University.
8. United States Environmental Protection Agency, "Asbestos," Chemical Safety and Pollution Prevention, http://www.epa.gov/asbestos/pubs/help.html (accessed 1 December 2010).
9. Eoin O. Cofaigh, John A. Olley and J. Owen Lewis, *The Climatic Dwelling: An Introduction to Climate-Responsive Residential Architecture* (London, James and James Publishing, 1996), 85.
10. Cofaigh, et al., 65.
11. Ibid, 65.

Box 2: Building Terms

Eaves: The edge of the roof that hangs over the enclosure of the house.

Enclosure: The part of the house that starts in the ground with the foundation and floor. It extends above the ground as walls and capped with a roof

Envelope: The shell of the house including the roof, walls and floor.

Ell: A wing of a building at right angles to the main structure or A right-angled bend in a pipe or conduit; an elbow

Foundation: Part of the wall located below ground level and wider than the wall itself, which it supports; it is usually made of cement.

Roof: The exterior surface and its supporting structures on the top of a building. Roofs are generally exposed to heat, rain and hail.

Ventilation: the process of "changing" or replacing air in any space to provide high indoor air quality (i.e. to control temperature, replenish oxygen, or remove moisture, odors, smoke, heat, dust, airborne bacteria, and carbon dioxide). Ventilation is used to remove unpleasant smells and excessive moisture, introduce outside air, to keep interior building air circulating, and to prevent stagnation of the interior air.

Walls: Exposed to wind and rain. Key issues of wall durability include holes, doors, windows and decks.

In visiting several homes, however, we observed that wood stoves (biomass) are being used and the proposed biogas appliances are not present. This requires residents to collect or purchase the wood needed to operate the stoves, failing to achieve the time-savings associated with the biogas system. Another consideration is deforestation encouraged by reliance on wood as a primary fuel. Residents accustomed to biomass systems may require some education or training on the benefits of the biogas stoves, but this should be pursued because of the savings that would follow their implementation (See Box 3).

Public Infrastructure Maintenance

Municipalities generally have insufficient resources to adequately maintain the system of public utilities in low-income communities once initial development work is completed.[12] The failure to install an adequate drainage system led to the flooding of several residents' backyards in Nuevo Juan del Grijalva. While this does not provide conclusive evidence about the city's infrastructure maintenance capabilities or ability to provide public services on a sustainable basis, it does indicate that certain vulnerabilities may exist. To ensure that SRC is sustainable, it is critical to develop institutions (private companies or public agencies) responsible for medium- to long-term maintenance of all public works.[13] Additionally, encouraging community participation is a key catalyst in developing a cohesive and sustainable system of utilities provision. International best practices include actively surveying customers who can play an effective role in improving the service of public utilities.[14] In Nuevo Juan del Grijalva, the local government was not fully

12. Rod Gould, City Manager, City of Santa Monica, CA, Interview by Martin Romo, 11 November 2010, transcript, Department of City and Regional Planning, Cornell University.

13. Eduardo Rojas, "Building Cities: Neighborhood Upgrading and Urban Quality of Life." *Inter-American Development Bank* (2010), http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=35132311.

14. Aldo Baietti, William Kingdom and Meike van Ginneken, "Characteristics of Well Performing Public Water Utilities," *World Bank Water Supply & Sanitation Working Notes* (2006), http://siteresources.worldbank.org/INTWSS/Resources/Workingnote9.pdf.

established, although the city has been in place for about a year. This reduces the ability of the community to get involved in maintenance.

Santiago el Pinar

At the time of our site visits in Santiago el Pinar, the construction was not finished, and therefore people had not moved into the new homes or used any of the new public amenities and services that will be offered. Thus, most of our concerns come from observation of the physical design of the city and the housing, as well as talking to those who were already living in the municipality. In several interviews, these established residents expressed concern that the housing constructed on the steep hillside would not be of sufficient quality and would ultimately fall.[15] Regardless of whether this speculation is correct, it reflects a lack of confidence in government projects that may be detrimental to the sustainability of the city. Although each design element holds specific costs, there exists several design opportunities that would strengthen the longevity of the homes in Santiago el Pinar (see Figure 4). The following sections detail some elements that need to be carefully addressed.

Box 3: Biomass and Biogas

Domestic biomass systems can range in complexity from stand-alone stoves that heat a single room to a wood-pellet boiler with an automated fuel supply that can run heated water. For domestic use, the fuel is usually wood pellets, wood chips or logs, but sometimes animal waste. In Nuevo Juan del Grijalva, it was observed that wood was being used for cooking.

Biogas systems utilize biogas (methane) which is emitted from human and animal waste and provides a clean-burning fuel to be used for stoves and lighting. The biogas system can be implemented either with biogas tanks at individual households or at a community biogas plant.

Benefits of biogas over biomass include:

- Improved smokeless stoves conserve 25% of the firewood that is needed for a traditional, wood-burning stove.
- Reduced time required to gather wood
- Protection of remaining forests
- Reduction of respiratory disorders caused by the fumes from cooking with firewood
- Improved community hygiene, as the biogas toilets lead to pathogen-destroying digestion tanks of the systems

Roof

The main concern in Santiago el Pinar is the inability of the short eaves to protect the envelope of the house from rain water (see Figure 15 in Appendix C: Housing Design). The rainwater will flow from the short eaves directly onto the envelope. Over time, this rainfall pattern will weaken the envelope and cause molding of the interior spaces. In Santiago el Pinar, we observed gable roofs with small eaves that extend a maximum of 8-10 inches from the enclosure of the house. This type of roof is comprised of two rectangular planes. The correct length of the eaves can be calculated from the horizontal projection of the roof, including the dimensions and slopes. For example, on a 6 foot slope roof where the dormer eaves overhang the ell roof, two eaves with overhangs measuring 3 1/3 feet are required. To ensure the longevity of the houses, eaves must be the proper length. (See Figure 16 in Appendix C: Housing Design).

15. Anonymous in Santiago el Pinar. Interview by Marcela González Rivas, 10 October 2010, transcript, Department of City and Regional Planning, Cornell University.

Figure 3: Flooded streeet in Nuevo Juan del Grijalva after light showers the previous evening.

Ventilation

As mentioned previously, adequate ventilation is necessary, especially in warmer climates. While the housing design for Santiago el Pinar includes windows, it does not exhibit additional ventilation measures to cool the housing units. This is particularly important because the temperature in Santiago el Pinar can be high (up to 40°C), and opening windows is not a sufficient measure to cool the housing. With proper ventilation near the roof, hot air rises, permitting cooler air to enter at the ground level (see Figure 16 in Appendix C: Housing Design). This is best practice and is also an affordable method of ventilation. Therefore it should be considered in future construction, as the lack of proper ventilation not only causes discomfort for the residents but also poses a risk to the durability of construction materials due to the pressure of the trapped heat. This heat can eventually create cracks on the envelope and the roof.

Envelope

A good waterproofing system has three main components: proper grading, adequate drainage, and the waterproofing of the wall itself.[16] Grading around the house must carry the water that is discharged from the roof clear of the building and divert downhill runoff around the house. According to a public official in Santiago el Pinar, one of the biggest problems with the houses is in the materials with which they were built. The walls are made with drywall consisting of fiberglass and the floor is made of wood pellets that cause it to be weak and unstable. Construction experts in Tuxtla Gutiérrez say that the ways in which the houses were built

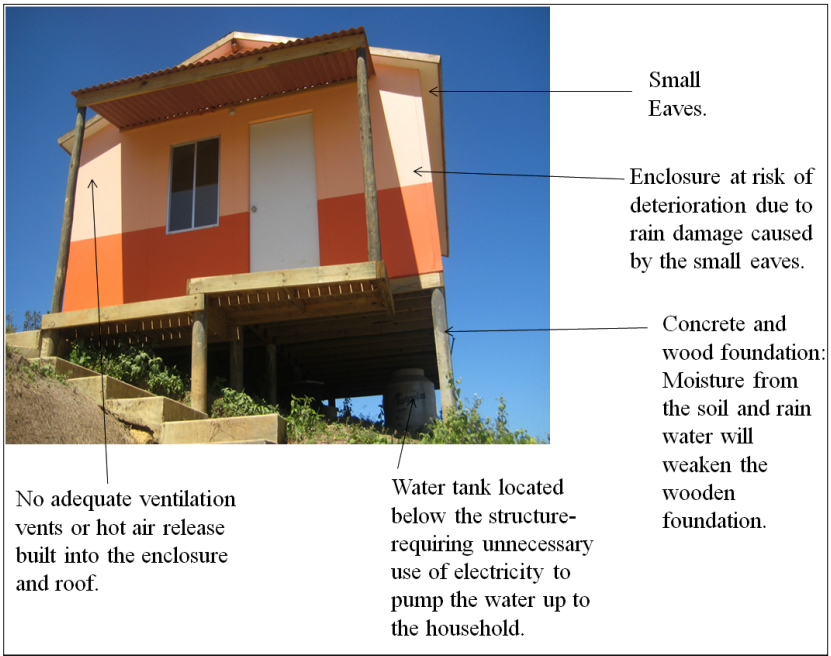

Figure 4: House in Santiago el Pinar labeled to display issues discussed in this report.

16. Manuel de la Cruz, "Protestan por Casas de Cartón' en Ciudad Rural Santiago el Pinar," *Mirada Sur*, http://miradasur.com/index.php?option=com_content&view=article&id=619:protestan-por-casas-de-carton-en-ciudad-rural-santiago-el-pinar&catid=1:latest-news&Itemid=59 (accessed 5 December 2010).

in Santiago el Pinar leave them vulnerable to future landslides and collapse. While the structure of the house is not immediately on the earth, the wooden columns that support the housing unit may be weakened by rain water.

Topography and Foundation

The concern of relating housing units to topography on level land is a straightforward task. These houses can be placed in a variety of locations, clustered and no excessive foundation depth will arise due to the conformation of land to the development.[17] Although some changes in elevation exist at Nuevo Juan del Grijalva, the foundations of the majority of housing units exhibit relatively stable grounds. However, this is not the case in Santiago el Pinar, where the topography of the site needs to be subject to careful studies of natural grades in order to minimize necessary cut and fill and deep foundations.[18] The housing units in Santiago el Pinar run perpendicular to the contour lines on sharp slopes. Moreover, slopes with longer runs present commensurately greater problems. To circumvent this problem, the housing units were designed to be held by wood/concrete columns bound by steel fixtures. The flow of rainfall from the short eaves to the envelope and eventually the wooden columns will serve to weaken the foundation of the houses. The addition of moisture from the soil and grass below the houses will contribute to the weakening of the home's structure. This is particularly problematic as these homes are elevated and overlook steep inclines.

Figure 5: Water tank under houses in Santiago el Pinar.

Water Management

Currently, the water tank is located below the housing unit in Santiago el Pinar. The current location is not efficient as the water must be pumped upwards into the house, an unnecessary use of electricity that requires the added cost of a pump for every house. There would be significant savings in electricity to residents by locating the water reservoir tank above the house, at roof level, and allowing water to flow down into the house by gravity. These tanks would require an independent, self-supported steel structure attached to each side of the house. The relocation of the pipelines to the top of the housing unit is also necessary, but no pump would be required. For future construction, according to the experts we interviewed, this can be a simple and economical solution.

Opportunities Moving Forward

The SRC program has the opportunity to create infrastructure that reflects best practices in urban and transportation design, utilities delivery, environmentally friendly construction, and low-cost rural housing. Following are suggestions for further investigation into best practices and

17. Klaber, 162.
18. Ibid, 162.

modification of the current SRC model.

Green construction

SRC, in the construction of these two cities, missed an opportunity to take leadership in building cities that aim to be sustainable in both economic and environmental terms. The climate of Chiapas presents the opportunity to use solar panels on the rooftops of homes in both communities (see Figure 3 in Appendix C: Housing Design). Advocates of active solar systems, who anticipate continued rapid escalation of energy costs, maintain that the relatively expensive system is cost-effective as it would eventually pay for itself in light of anticipated rises in energy prices.[19] It should be noted that the installation of the active solar would create savings energy costs that would be beneficial in the long-run.

In addition to active solar energy systems, there are other best practices in rural development that construct energy efficient homes at a significant lower cost of that of the houses of SRC, which was reported as 9000 USD per house.[20] For example, the homes designed by students at California State Polytechnic University, Pomona for a housing project in Tijuana are comparable in size and function to SRC homes. These homes use all green building materials and cost about 4000 USD per house.[21] (See Appendix B: Green Building Design for more information on environmentally responsible building materials).

Envelope

The warm climate of Chiapas requires the most effective means of cooling through design elements of the envelope, including walls, window and floor type. In sunny weather, the external surfaces become very hot, which facilitates the transfer of heat to the interior of the building. White-colored walls help to reflect solar radiation.[22] The window is also a critical design element of a house. To help control summer overheating, the use of low-pitched glazing is optimal.[23] The houses in SRC also risk receiving direct solar gain through the windows. It is optimal to direct incoming solar radiation on materials of high thermal mass, and incorporating an interior with high thermal mass would moderate the fluctuation in internal temperature and avoid overheating. Ideally, this would consist of a concrete floor with ceramic tiles.[24]

Conclusion

Following our site visit to Chiapas, several concerns about the safety, efficiency, and implementation of the infrastructure emerged in Nuevo Juan del Grijalva and Santiago el Pinar.

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19. Jonathan Lane, *Energy-Efficient Housing Design: A Combined Approach* (New York, Reinhold Company, 1986), 4-5.
20. Michigan Business School, "Replicating Sustainable Rural Cities Based on an Analysis of Nuevo Juan Del Grijalva", *University of Michigan*, http://webuser.bus.umich.edu/tichy/ChiapasBooklet2010.pdf.
21. California State University, Pomona, "Low-Cost Sustainable House Prototype", http://www.csupomona.edu/~pmlaroche/rdocs/LaRocheTijuana126P.pdf (accessed 28 October 2010).
22. Ibid.
23. Cofaigh, et al., 83.
24. Ibid., 86.

There are a number of opportunities for cost-reduction and more efficient construction that should be considered (see Table 1B in Appendix B: Green Building Design). Residents' confidence in the quality of housing is essential to the sustainability of SRC. As it stands, too many of those interviewed had serious problems with the construction of the new cities and houses under SRC. In addition, mechanisms for residents to file complaints and actively participate in improving the situation are not in place. Until these problems are addressed, the sustainability of SRC is decidedly uncertain.

Economic Viability

The new cities and villages under the SRC program are portrayed as a remedy for dispersion, risk of natural disasters, and poverty. However, the transition for residents from a traditional lifestyle to an urban market economy livelihood remains a major underlying concern. Traditionally, residents of Nuevo Juan del Grijalva were accustomed to a subsistence agriculture mode of production. Not only is this a fundamental change and a major milestone for residents in terms of adaptation, but it also poses a significant challenge to the long-term sustainability of any new city. The transition to an urban market economy creates the need to acquire essential goods—such as food—through purchase. Thus, job creation and income generation play a vital part in the sustainability of this new city. Without adequate jobs, residents are unlikely to stay in the newly created city as they lack the agricultural safety net they had at their previous residences.

The SRC program includes initiatives that aim at creating income-generating opportunities for the residents of the new cities. However, our analysis indicates that the initiatives face major limitations from the way they were established and have not been able to provide an adequate number of jobs for residents of Nuevo Juan del Grijalva. Moreover, the economies of these new settlements are very isolated from strong markets and restricted by weak local demand.

In this section, we analyze the economic viability of SRC. First, the section focuses on the existing productive projects, describing how they are ineffective at providing a stable source of income for families and the disconnect that exists between the stakeholders' expectations and the designers of the program regarding their capacity to generate income. The second part of this section includes an analysis of two main elements of successful cooperatives, from which the productive projects established in Nuevo Juan del Grijalva can draw lessons. Next, the section focuses on the main limitation that not only the productive projects of the newly created cities and villages under the SRC face, but also the economy as a whole: the lack of local consumer market and isolation from robust markets elsewhere. This part discusses alternatives to standalone rural cities, including the benefits of strengthening pre-existing centers and supplementing the program with improved rural development programs. Finally, the section concludes by arguing that more effective, early involvement of residents in establishing the productive projects can improve their sustainability. The section concentrates exclusively on Nuevo Juan del Grijalva, as the productive projects in Santiago el Pinar are not yet fully established.

Existing Productive Projects: Lack of Transparency and Inability to Generate Stable Incomes

The productive projects in SRC are the main feature of economic development efforts in Nuevo Juan del Grijalva, but it remains unclear if these productive projects were meant to be the primary source of income for residents. We found that many residents of Nuevo Juan del Grijalva regularly return to their previous residences to work their land in order to earn a decent living. This implies that many residents do not work within the city to generate their primary income. In an interview with Esteban Moctezuma Barragán, President of Fundación Azteca, he explained that most rural cities are meant to be within a three hour walk of "small ranches, families and all

that live far away."[1] The "three hour walk" distance was established because three hours was the amount of time many children took to walk to school in their previous residences. The idea was to create a center where children could go to school and parents could travel the distance to get to work. While this is a positive benefit for women and children, it makes it difficult to generate income as the family member with the main source of income has to dedicate more time and money to travel.

In the same interview, Barragan claimed that "more or less 70% of those that inhabit a rural city find work with earning capacity, with higher income, within the city than they were developing before as *campesinos*, fishermen, ranchers."[2] However, Barragan's observations contrast with our own. In fact, in our interviews, many people lamented that they were not able to provide for themselves while working only within the city. Further, the productive projects were meant to be complementary to the main income of SRC residents.[3] While SRC envisaged the productive projects as complementary to residents' main income sources, the residents may have had an opposing set of expectations. This disconnect has led to discontent and dissatisfaction among some residents.

We were unable to obtain clear information about the process of planning and implementation of the productive projects. In an interview with a government official, it was clarified that a study of economic productivity was done before the city was constructed. This study provided government officials with some information about the advantages of the region and skills of residents, prior to choosing the types of productive projects.[4] They recognize that the residents will choose to abandon the city in the absence of satisfactory jobs. This top-down approach to planning the productive projects involved little consultation with the local community regarding what these projects should consist of or how they should function. As mentioned before, lack of participation in the planning process jeopardizes the overall sustainability of both the productive projects and SRC in general.

Most residents we spoke to commented on how the productive projects were not viable and said they would like to go back to their way of life before SRC. Many residents, primarily men, return to their land for days at a time instead of commuting daily. This could be detrimental to the community fabric, as families are unintentionally separated through this attempt to bring people closer together. According to an interview with a local NGO, community networks are often times more beneficial to the well-being of communities than the commonly accepted services to improve lives.[5] Communities tend to have alternative community safety nets and problem mitigation techniques that are disrupted when communities are torn apart.

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1. Esteban Moctezuma Barragan, Presidente Ejecutivo Fundacion Azteca. Interview by Anabella Pezet 4 November 2010, video transcript, http://www.youtube.com/watch?v=DtnNUKviUC4.
2. Ibid.
3. Anonymous. Interview by Martin Romo, 5 November 2010, transcript, Department of City and Regional Planning, Cornell University.
4. Anonymous. Interview by Callie Ham, 26 October 2010, transcript, Department of City and Regional Planning, Cornell University.
5. Anonymous. Interview by Karla De Leon, 28 October 2010, transcript, Department of City and Regional Planning, Cornell University.

Our interviews and observations lead us to conclude that the majority of the productive projects are ineffective at providing residents with a decent, stable salary. We believe that the lack of prosperous productive projects is positively correlated with the lack of participatory planning and the absence of a robust economy. The dearth of productive projects does not bode well for the long-term sustainability of the SRC, especially when those rural cities are being promoted as communities that offer job opportunities to residents. The fact is that a lack of economic opportunities increases the odds that residents will abandon a city, and conversely, a profusion of economic opportunities increases the odds that residents will remain in a city. Simply stated, individuals do not want to reside in a city that lacks economic opportunities, thus efforts must be made to improve these viable projects.

Cooperatives: Two Main Lessons

Many of the productive projects we visited – such as the local greenhouses growing chilies, a local hotel (*posada*), small grocery stores or convenience stores, and small restaurants or local eateries – are set up as cooperatives. For the purpose of this report, we will define a cooperative as "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise."[6] In conversations with various community members, it was apparent that these cooperatives are not operating efficiently and effectively. While we recognize that they are in their early stages, and hence cannot be fully evaluated, we have reason to believe that their setup is fundamentally flawed. This section will concentrate on the reasons we believe this: access to information and education and contact with robust economic markets.

Analyses of successful cooperatives, such as SANASA, the AMUL Dairy Co-operative, and MONDRAGON Corporation, provide a didactic guide of best practices. During developmental stages, each of these fruitful cooperatives showed a particular commitment to promoting education, training, and information, and establishing direct contact with vibrant local and distant economic markets. Thus, we have concluded that other cooperatives should also concentrate on these two basic principles.

The first common principle among the thriving cooperatives – a commitment to education, training, and information – concentrates on the diffusion of knowledge. These cooperatives provide education and training for their members and employees, so that they can improve their skills and further develop the organization. These cooperatives also organize information sessions in order to help members make sound decisions, especially when rumors and fear mongering distort public discussions.

An ardent commitment to education, training, and information was not evident during our visit to Nuevo Juan del Grijalva. Many members of cooperatives stated that they had not received any education or training from the government, of if they did, it was very limited. These individuals expressed feelings of abandonment, acknowledging that while government had aided them in organizing the cooperatives, soon after, the government was nowhere to be seen. Furthermore,

6. International Co-operative Alliance, "Statement on the Co-Operative Identity," http://www.ica.coop/coop/principles.html (accessed 10 November 2010).

these individuals felt that the government provided them with limited information on how to run the business, causing many to lose faith in the legitimacy of the program.

The second common principle among the successful cooperatives – a need to establish a connection with robust economies – focuses on the economic reality of managing a profitable organization: a lack of customers means no business. Each of these previously noted, successful cooperatives vehemently understands that it will go bankrupt if it does not have access to real consumer demand. Members of cooperatives who were interviewed in Nuevo Juan del Grijalva understood this basic principle, but it is unclear whether or not these cooperatives have established relationships with vibrant consumer markets.

Various news articles have praised the success of the productive agricultural projects in Nuevo Juan del Grijalva (cacao processing, greenhouses, and cheese production).[7] During our visit, the cacao fermentation and processing plant was closed, so we were unable to speak with any workers or representatives of the cooperative and therefore cannot fully assess its productive capacity. However, we were able to speak to members of the greenhouse cooperatives and the cheese production cooperative. The cheese production cooperative, having penetrated the Nuevo Juan del Grijalva and Tuxtla Gutiérrez consumer markets, seemed to be thriving. The greenhouses were in a precarious state, as various cooperative members had withdrawn. Initially, the greenhouses were intended to be worked in cooperative fashion with ten community members working on each greenhouse. However, after speaking with a few of these greenhouse workers, we found that one year in, most greenhouses are being cultivated by only three or four community members each. One resident explained that after the initial harvest, many members of the cooperative left because they did not earn enough to make it worth their while. The same was true for at least two other greenhouses. It was evident that many members had left the cooperative, which implies that only a select few residents are benefiting from these projects. This is neither cost effective as a social investment, nor does it imply that the city as a whole is prospering if only a few residents are earning adequate incomes. In addition, it was unclear if there was a buyer for the habanero peppers that were about to be harvested.

Unlike the export-based cooperatives discussed above, there are a number of other cooperatives in Nuevo Juan del Grijalva that are entirely dependent on local demand, which has proven to be highly unstable and irregular. For instance, the hotel rarely accommodates patrons, aside from a few engineers and teachers who work in the city. The local eateries are often closed for lack of customers. Most residents in the town traditionally eat in their own homes, as they do not have enough disposable income to dine out. These examples not only attest to the unstable local consumer market of the city, endangering the basic survival of these cooperatives, but they also reinforce the need for participatory planning. Regardless of whether one is seeking an export-led growth model or local economic growth model, any business needs to have a consumer market in order to effectively grow as a firm and generate income.

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7. Unknown Author, "Productos de Nuevo Juan del Grijalva Trascienden a Nivel Internacional." *El Heraldo de Chiapas, http://www.oem.com.mx/elheraldodechiapas/notas/n1854623.htm (accessed* 10 November 2010); and Unknown Author, "Se Consolida en CRS Nuevo Juan del Grijalva la Produccion de Habanero; Proyectan 21 Mil Kilogramos," *La Cronica de Hoy*, http://www.cronica.com.mx/nota.php?id_nota=533023 *(accessed* 10 November 2010).

Simply stated, a cooperative will not prosper or survive if it has unskilled and untrained members, who have not been able to establish a relationship with a robust consumer market. Thus, at the very least, addressing these two principles will improve the odds that cooperatives will post profits and decrease the probability that individuals will abandon the cooperatives.

Lack of Consumer Market

In the following section, we will explore in more depth two possible explanations for the lack of consumer market as it applies to the cooperatives established by SRC. Our chief concerns in regards to access to a consumer market are the isolation of Nuevo Juan del Grijalva and the missed opportunity to make use of the local consumer market.

Isolation and Alternatives to Greenfield Construction

Although Nuevo Juan del Grijalva is located approximately one hour's drive from Ostuacán, the lack of a formal transportation system connecting the two cities makes it difficult for people and goods to travel between the cities. The city appears to be disconnected from the surrounding area, making it difficult for residents to take advantage of the benefits of urbanization, agglomeration and economies of scale.

The isolation of the city also makes it difficult to trade products. Being located geographically closer to other urban areas would have benefitted Nuevo Juan del Grijalva, as these established urban areas would have provided "external markets as the source of both products and services that are not produced locally, and as the destination for most local production."[8] It would have allowed for a dynamic two-way flow of goods and people, and as mentioned in the infrastructure section, would make public transportation systems more economically feasible. This close proximity not only would have led to the opening of markets for both production and consumption but it would have benefitted many more people than the existing 410 households accounted for in the construction of this new city.

If density is a solution to problems of dispersion, marginalization, and poverty, then the possible expansion of established urban centers instead of constructing an entire new city is a viable alternative to the current SRC program. This alternative would avoid the problem of isolation. Furthermore, it is more cost-effective to increase capacity in an existing school or hospital located in an already densely populated area. Extension of the current road networks and transportation systems is a less costly way to promote access and connectivity to markets. Improving water and sanitation services in existing city centers would also benefit more people than building a city from scratch. In terms of environmental sustainability, the construction of an entirely new city requires an increased use of resources, overall land-use and building materials, as well as a loss of natural resources through land clearance for construction. Strengthening established urban centers would also avoid relocation and displacement of families, a process that generally has deleterious effects on communities.

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8. David Freshwater. "The 'New' Open Economy: What Has Changed in Rural Areas." in *Rural Policy at the Crossroads, ed.* G. Dalton, J. Bryden, M. Shucksmith and K. Thomson (Aberdeen: Arkleton Center for Rural Development Research, 2003), 55.

While we advise against building entire new cities, if they are constructed, it is important to choose sites that adequately take advantage of established urban centers and markets to promote economic growth. While urbanization is the predominant trend in Mexico, many people will continue to live in rural areas, following traditional lifestyles outside SRC and established urban centers. A program of development that recognizes this is needed to improve rural standards of living and increase the economic productivity of rural people. This can best be accomplished through the provision of public goods to rural areas such as infrastructure, environmental protection, and research and development assistance.[9] Public investment in these areas both encourages inflows of private capital to the area and raises the productivity of those affected by such investments.[10] This is especially relevant for lower income populations. Their primary asset is typically their own labor, but they do not generally have access to credit markets that would enable them to make investments in human capital, leaving them dependent on public investment for development.[11]

The type of investment made in rural areas is important. Agriculture is typically the predominant economic activity of rural areas, and as such the prevailing development paradigm of rural development is to directly subsidize agricultural producers, through vehicles such as credit extension, tax credits, research grants, or even direct transfers of resources or capital.[12] However, this approach under-invests in non-farm rural activities, generates returns that are typically captured by relatively wealthy private interests rather than the broader community, and is at best ineffective in encouraging private investment and technological adaptation.[13] Furthermore, such producer-subsidy expenditures tend to crowd out investment in public goods, which leads to long-term underinvestment of private capital.[14] Instead, the focus of investment should be on appropriate and scalable technology generation and transfer, soil conservation, sanitary protection, communications and information services, transportation systems, provision of utilities such as power and water to rural areas, and provision of social services such as education and health.[15] Such a strategy encourages private investment and generates returns that accrue to the community at large, and benefits the non-farm sector as well as agriculture.

Local Market: A Missed Opportunity for Growth

In the SRC context, those businesses that produce for local consumption are not essential, whereas the export-oriented businesses appear to be more viable options for local economic activity. For example, the restaurants are not essential in Nuevo Juan del Grijalva since residents tend to eat at home rather than a restaurant. This is a result of little disposable income.

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9. David De Ferranti, "Public Expenditures, RNR Productivity, and Development." in *Beyond the City: The Rural Contribution to Development,* ed. Guillermo E. Perry, William Foster, Daniel Lederman, Alberto Valdes and David M. De Ferranti (Washington, D.C: The World Bank, 2005), 128-129.
10. World Bank, *The Quality of Growth* (New York: Oxford University Press. 2000), 66.
11. Ibid., 49.
12. Frank Ellis and Stephen Biggs,"Evolving Themes in Rural Development, 1950s – 2000s" in *Development Policy Review* 19 no. 4 (2001): 440.
13. Ibid.
14. Ramón López and Alberto Valdéz, *Fighting Rural Poverty in Latin America: New Evidence and Policy* (New York: Palgrave Macmillan, 2001), 22-24.
15. Ibid.

Similarly, during our visit we observed that the chicken productive project, with approximately 500 chickens in each cooperative, produces eggs that are exported to larger cities such as Ostuacán and Tuxtla Gutiérrez. On the other hand, the eggs being sold at the Super Chiapas grocery stores throughout the city come from a variety of external sources. This practice is unsustainable from an environmental standpoint as food has to travel many miles thus incurring larger environmental costs. Aside from the lost opportunity to promote environmentally sustainable food production and consumption, it also fails to take advantage of a local market that would help stimulate local economic growth. While the export-led model of economic growth is the dominant approach to development, consumption-based growth through local production and consumption "can also be a source of regional job growth and stability."[16]

Figure 7: Productive project, Super Chiapas, is underused.

Even in choosing a consumption-based model, it is important to remember that there is no locality that can exist in complete isolation. There are critical linkages between rural and urban areas. Forward linkages refer to "the connection of one sector to the rest of the economy as it supplies production inputs to other productive sectors."[17] Backward linkages refer to "the demand for goods and services as inputs for other sectors."[18] Research shows that agriculture growth and increases in agricultural income increases demand for non-agricultural goods and services, thus stimulating economic growth.[19] These backward and forward linkages are strengthened when goods and services are produced and consumed locally.[20]

The local consumption model may be a particularly useful approach for food and agricultural production. Food is an essential product that residents need to purchase, as their individual productive backyards are not sufficient to meet their consumption needs. Coming from a subsistence agriculture background, the population is accustomed to food production. Investing in agricultural production for local consumption may be beneficial not only in terms of economic growth and stability (as previously discussed through backward and forward linkages) but also in terms of health and community development. If local production and consumption for sale is not taken advantage of, it would be useful to look to communal plots of agricultural land. This

16. Ann Markusen and Greg Schrock, "Consumption Driven Urban Development" *Urban Geography 30* no. 4 (2009): 344.

17. De Ferranti, et al., 34.

18. Ibid.

19. Christopher Delgado, Jane Hopkins, Valerie Kelly, P.B.R. Hazell, Anna A. McKenna, Peter Gruhn, Behjat Hojjati, Jayashree Sil and Claude Courbois, "Agricultural Growth Linkages in Sub-Saharan Africa", *International Food Policy Research Institute* 107 (1998): 15.

20. J.W. Mellor, The New Economics of Growth: A Strategy for India and the Developing World (Ithaca, NY: Cornell University Press, 1976), 182.

could allow community members to feel a greater sense of community involvement and control. Communities feel disempowered because participating in the global food system can distance communities from the process of food production.[21] The sense of belonging to a community that produces for itself "can confer a sense of connection and responsibility to a particular locality."[22] A local consumption growth model, particularly through agricultural production, could benefit residents through empowerment and involvement, similar to the benefits of a participatory approach.

Insufficient Participation

A stronger participatory process would potentially improve the situation as citizens contribute local knowledge that those who are in charge of planning do not possess. Stakeholders might have a better idea of what businesses would work best in their community. Furthermore, they may have a beneficial set of skills unknown to those planning productive projects. The process used to choose and distribute productive projects among the residents is vague and unclear. Some residents commented on how they were only allowed to choose productive projects from a list on a first come, first served basis. They had little to no say in choosing the type of businesses that were available. This type of disassociation from the planning process is a major hindrance for long-term sustainability. A thorough participation process allows residents to feel engaged and invested in their community, increasing their commitment.

Within the first year, many productive projects have been abandoned. While we cannot confirm that a more participatory process would ensure the sustainability of businesses, we can point to research that supports this assertion. This process may be more time consuming, but "the product is more likely to succeed because it is more responsive to the needs of the people who will use it."[23] Residents will feel a greater sense of ownership if they were involved in the planning process and thus are less likely to leave.

According to economist Joseph Stiglitz, open and transparent participatory processes are essential to encourage sustainable development.[24] A useful tool in any inclusive participatory process is the strategy of consensus building. Consensus building allows for "a long-term effort to develop a shared understanding and agree on a strategy to deal with an uncertain and evolving future, while addressing a broad, shared concern with planning and policy."[25] Stiglitz stresses that "consensus building, open dialogue and the promotion of an active civil society are more likely to result in politically sustainable economic policies and to spur the development transformation."[26] These processes are essential to the sustainability of any new city. It is important to keep in mind that

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21. William B. Lacy, "Empowering Communities Through Public Works, Science and Local Food Systems: Revisiting Democracy and Globalization" *Rural Sociology 65* no. 1 (March 2000): 19.
22. Ibid, 21.
23. Frederick R. Steiner and Kent Butler, *Planning and Urban Design Standards* (New Jersey: John Wiley & Sons, 2007), 47.
24. Joseph E. Stiglitz, "Participation and Development: Perspectives from the Comprehensive Development Paradigm" *Review of Development Economics* 6 no. 2 (2002): 180.
25. Judith Innes, "Consensus Building as Role Playing and Bricolage," *APA Journal Winter* (1999): 11.
26. Stiglitz, 177.

participation can take many forms that ensure citizen power will be the most successful.[27] (For more information on community participation see Appendix A: Participatory Planning).

Conclusion

The lack of success of the productive projects is not a consequence of any character flaw in the residents of Nuevo Juan del Grijalva. Rather, the issue lies in the underlying structural flaws of productive projects. Broader participation in the setup and selection of projects would improve their chances of sustainability as residents' local knowledge and skill sets would be better used. As cooperatives, both the larger agricultural projects and the ventures aimed at serving only a local demand need to follow best practices and provide education and training in addition to being sure of access to a sustainable market. In focusing solely on exports, the agricultural productive projects have failed to take advantage of the local market for their products. At the same time, the local, service-oriented productive projects entirely lack a consumer market.

The isolation of the city only adds to the other challenges of constructing an entirely new city such as creating adequate jobs and a vibrant consumer market. Because of this, we advise against further greenfield construction and instead recommend strengthening established urban centers in Chiapas. In addition, SRC should be complemented by a rural development program. Greater participation and an emphasis on regional economic growth would help communities flourish regardless of whether one chooses an export-led model of growth or a local consumption model.

27. Sherry Arnstein, "A Ladder of Citizen Participation," *Journal of the American Institute of Planners 35* no. 4 (1969): 218.

Basic Services and Additional Considerations

This report has discussed at length the program shortcomings on infrastructure and economic productive projects. We have also identified other areas where the existing cities can be improved. The SRC program is notably an improvement for most stakeholders in that it provides access to basic services like water, sanitation, and electricity, as well as health care and education. However, there are concerns that need to be addressed about the provision of services. This section will focus on the main concerns that we observed in our field visit. In particular, stakeholders worry about service continuity, affordability, quality, and access. As we have noted throughout the report, a strong participatory planning process can greatly impact the success of SRC.

While analyzing service delivery in the SRC program, it is critical to note that residents previously had limited, if any, access to basic public services when they lived in small dispersed communities. Most households and communities did not have electricity connections, access to piped water, links to drainage and sanitation systems or access to telecommunication networks. In this regard, the SRC program has been successful in providing access to utilities and connectivity to communication networks. In both Nuevo Juan del Grijalva and Santiago el Pinar residents have electricity connections, piped water, water tanks, drainage and sanitation services, waste disposal points and basic connectivity solutions. Although these are overall improvements from their lifestyle prior to SRC, there are ways these services could be improved. The following section highlights some of the ways service delivery could be improved in current and future sustainable rural cities.

Health Care and Education

One of the objectives of the SRC program is to provide basic services to populations that were previously highly dispersed, most notably health care and education. These services were viewed favorably within the newly established communities. However, through interviews with residents in Nuevo Juan del Grijalva, Santiago el Pinar, and representatives of international NGOs working in related areas in Chiapas, we identified several concerns related to the provision of these services in the new cities. This section emphasizes concerns as well as alternatives through which services can be provided to populations that ensure sustainability through participation. In interviews conducted in Nuevo Juan del Grijalva, residents provided mostly positive feedback on health care services. Several residents responded positively to availability of the health care clinic in Nuevo Juan del Grijalva. However, other residents expressed concerns that tempered their approval. One noted that there were no ambulances to take more severe cases that could not be handled in the clinic to Ostuacán. He also mentioned that residents often cannot fill their prescriptions as they do not have the money to buy medicine.[1] Another resident described a long wait time followed by a diagnosis and prescription that did not sufficiently treat the pain. That

1. Anonymous in Nuevo Juan del Grijalva. Interview by Glenn Garcia and Martin Romo, 9 October 2010, transcript, Department of City and Regional Planning, Cornell University.

person reported seeking better treatment in Ostuacán at a significant personal cost.[2]

A Chiapas-based NGO member spoke in an interview about the funding of the health clinic in Nuevo Juan del Grijalva. He expressed concern about the continuity of the service, as private funders may not provide support indefinitely, since it is not their responsibility. He also conveyed concern that the company may consider trying to recoup costs by charging for health care, when it is normally provided free by the government.[3]

In an interview with a professional, concerns were raised about the selection of priorities for improving health care in SRC. He stated that the family and community networks that exist, even in dispersed rural areas, are often better at solving minor health concerns than clinics. He emphasized that disrupting those networks can be detrimental to public health and a more effective investment in improving basic health than building a clinic might be the delivery of clean water[4].

Consistent with the physician's view, the World Health Organization suggests an "active planning cycle" framework for participatory planning of rural health care development that ensures community members are informed and engaged in the process of establishing a clinic, confronting any logistical problems, and evaluating its effectiveness.[5] This participation is critical to the sustainability of any development initiative. What is key for Chiapas is the initial discussion with residents to assess the health profile of the community and understand the needs and desires of the community. Another study identified six common factors for sustainable change in relation to local engagement in contemporary health systems, two of which were applicable to the sustainability of SRC:

- "the presence of a range of non-governmental health-care agencies which offer both diversity as individual service options and together a collective movement for community health improvement;"

- "the inclusion of locally legitimized alternative and complimentary health services within strategies for health systems development."[6]

Each city in SRC should provide more data to refine and improve the participatory process for any future development.

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2. Anonymous in Nuevo Juan del Grijalva. Interview by Glenn Garcia and Martin Romo, 9 October 2010, transcript, Department of City and Regional Planning, Cornell University.

3. Anonymous NGO Staff Member. Interview by Marcela González Rivas, 10 October 2010, transcript, Department of City and Regional Planning, Cornell University.

4. Anonymous in Nuevo Juan del Grijalva. Interview by Marcela González Rivas, 9 October 2010, transcript, Department of City and Regional Planning, Cornell University.

5. Agis Tsouros, " Community Participation in Local Health and Sustainable Development," *World Health Organization* (2002): 20-24.

6. Geoffrey D. Meads, Frances E. Griffiths, Sarah D. Goode, and Michiyo Iwami, "Lessons from Local Engagement in Latin American Health Systems," *Health Expectations* 10 (2007): 411-412.

In a study of rural Mexico and incomes of *ejido* households, education emerged as the primary determinant of an individual's ability to transition from low-wage or subsistence farm labor to higher income, nonfarm employment.[7] Higher returns on education are seen as individual's progress past a primary or advanced primary education. In order to achieve the goal of poverty alleviation in Chiapas, it is vital that the SRC program's education system be well-executed. In interviews with residents and local stakeholders, the system was well-received; however, there were some structural and operational concerns

While several residents in Nuevo Juan del Grijalva lauded the improved access to education for their children, others noted that the system should be expanded to include preparatory schooling for students aged 15-18. Even though in Nuevo Juan del Grijalva higher level education is available via videoconferencing, we observed that internet service is unreliable and presents limitations for continued learning.[8] In Santiago el Pinar, construction is ongoing, but some educational concerns were arising. In one interview, it was stated that the schools would be taught in Spanish, although most of the population in that municipality speaks only Tzotzil.[9] In an interview with a member of an international NGO, it was stated that schools in the SRCs are following the standard curriculum put forth by the federal government (formal subjects, such as Spanish, math, science, etc.)[10] However, in Chiapas and most notably in Santiago el Pinar, community participation – consistent with a participatory planning approach – in the school curriculum would be beneficial. For example, some communities in Chiapas working with NGOs have developed curricula that incorporate traditional values and skills in addition to the standard curriculum; the federal government approved these curricula.[11]

Education plays a pivotal role in development and has been accounted for in the SRC. The creation of well-equipped and staffed facilities enables greater access to education for large portions of the rural population. As educational attainment increases within the city, so will the propensity to take higher-skilled professions in the workforce. Until these necessary levels are attained, it must be ensured that facilities are properly staffed to perpetuate operations and assure the desired outcomes of these projects. Previous development projects demonstrate that ill management can lead to failed or inefficient programs. Certain cases, like one in Indonesia, have shown that enacting compulsory services for medical students can serve the needs of rural communities.[12]

In terms of skilled health professionals, it seems overly optimistic to assume that the city will

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7. Alain De Janvry and Elisabeth Sadoulet, "Income Strategies among Rural Households in Mexico: The Role of Off-Farm Activities," *World Development* 29 no.3 (2001): 479.

8. Anonymous. Interview by Marcela González Rivas, 9 October 2010, transcript, Department of City and Regional Planning, Cornell University.

9. Ibid.

10. Anonymous International NGO. Interview by Marcela González Rivas, 11 October 2010, transcript, Department of City and Regional Planning, Cornell University.

11. Ibid.

12. Kenneth M. Chomitz, Gunawan Setiadi, Azrul Azwar, Nusye Ismail, and Widiyarti Chomitz, "What do Doctors Want?: Developing Incentives for Doctors to Serve in Indonesia's Rural and Remote Areas," *Policy Research Working Paper, The World Bank Development Research Group 1888*(March 1998): 2.

be able to produce its own doctors given its limited population and its remote location. For this reason, staff will most likely come from other areas and will likely require incentives in order to relocate. Case studies demonstrate that when financial incentives are given to skilled professionals (e.g., higher wages), the costs become too high to be sustainable.[13] Furthermore, literature shows that in rural communities most young people assume they must move to more urban cities to find employment opportunities, and typically end up doing so.[14]

The reactions to the new education and health services implemented through SRC were overwhelmingly positive in most interviews with residents and local officials. In this marginalized community, residents recognize the value of a better educational system for their children and improved health care for their families. Improvement from unacceptable levels is progress, but measures must be taken to ensure that the quality of the services offered does not suffer from lack of resources or poor planning. The concerns raised in the previous pages represent an opportunity for SRC to emulate best practices and create truly sustainable rural health and education systems.

Affordability

Much like the delivery of education and health care, the access to basic services like water and electricity have been a vast improvement for the lives of many residents of Nuevo Juan del Grijalva. However, it is important to take into account the affordability of these utilities in order to adequately determine whether or not residents are better off. Interviews with residents of Nuevo Juan del Grijalva highlighted confusion over electricity billing. Two small business owners, speaking separately about the costs of running their businesses, mentioned that their bills were very high, ranging from 1,000 to 8,000 pesos bimonthly. Furthermore, they expressed dissatisfaction with the inability to raise concerns about such utility problems – both reported being told not to complain.[15]

A system for addressing complaints is vital to the sustainability of SRC. Residents of Nuevo Juan del Grijalva are new to the system and are not familiar with the electricity structure or with the nationwide problems that Mexico has been experiencing, such as protests resulting from electricity rate hikes of almost 54 percent between the year 2000 and 2009.[16] The overall affordability of electricity and other utilities is clearly a priority that must be addressed.

Even though it may not be practical to simplify the existing system for residents of the new cities, it is important that residents are provided with the necessary information about this structure in order for them to be comfortable in paying their bills on a consistent basis. In order for

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13. Ibid.

14. South African Government Online, "The Integrated Sustainable Rural Development Strategy,", http://www.info.gov.za/otherdocs/2000/isrds.pdf (accessed 3 November 2010).

15. Anonymous in Santiago el Pinar. Interview by Marcela González Rivas, 10 October 2010, transcript, Department of City and Regional Planning, Cornell University.

16. Luis A. Boffil Gomez, Angeles Mariscal, Rene Alberto Lopez and Elio Henriquez, "Miles de Usuarios Dejan de Pagar el Consumo de Electricidad por Altas Tarifas." *La Jornada*, http://www.jornada.unam.mx/2009/07/30/index.php?section=economia&article=025n1eco (accessed 28 November 2010).

real sustainability to be achieved, the bills must also be affordable relative to the income of the residents or store owners paying them.

The introduction of state-level subsidies may not necessarily be an effective mechanism to address the immediate affordability of utility services. However, when considering subsequent tariff increases in the future, a subsidy may become necessary. Several governments around the world have relied on subsidies in the short term and transitioning toward the proposed cost recovery or market based tariffs.[17] It is important to address affordability issues for the sustainability of new cities built within the scope of the SRC program. Significant tariff hikes such as the 27.5% increase in residential electricity tariffs in 2001-2002 and 20.9% hike in medium sized business tariffs in 2003-2003 or potential privatization plans of public utility services may impact the sustainability of the new cities.[18]

Transportation

Adequate and affordable transportation is critical in ensuring the sustainability of communities. Improved transportation options and infrastructure facilitate access to markets and help bring rural residents into the cash economy to boost productivity and raise standards of living.[19] SRC acknowledged the importance of good transportation links by building modern roads within and to Nuevo Juan del Grijalva. While the construction and maintenance of these roads may bring benefits to the SRC towns, modern automobile-oriented roads alone should not be seen as a complete solution to the issues of rural transportation. Instead, roads should serve as a necessary first step in a longer process of creating a transportation network that meets the needs of its users.

While some owners of private cars have begun to hire their services out as taxis to facilitate transportation, their availability is limited and their services are not affordable to all on a regular basis. Those who lack access to regular automobile transportation, typically the poorest in a community, are in the most need of the social and economic benefits that improved transportation networks, such as bus routes, can bring. Many resort to walking long distances to meet their transportation needs. In Nuevo Juan del Grijalva, for instance, many citizens regularly commute by foot to their previous homes to work their farmland, or to bring goods to market. This is not only a hardship that reduces quality of life, but it is an economic inefficiency that significantly reduces productive output. Not being able to afford automobiles, SRC residents can benefit from public transportation.

Affordable public passenger and freight transportation could be an excellent tool to encourage the integration of new villages into the regional economy by tying the new towns to existing urban

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17. Kristin Komives, Vivien Foster, Jonathan Halpern and Quentin Wodon with support from Roohi Abdullah. "Water, Electricity, and the Poor: Who Benefits from Utility Subsidies?", *World Bank Directions in Development Publications* (2005): 6; Pablo Serra, "Subsidies in Chilean Public Utilities." *Universidead de Chile* (2000), http://info.worldbank.org/etools/docs/library/64572/wps2445.pdf.

18. Secretaría de Energía Electricity Statistics, "National Electricity Sector: Average Price of Electricity by End-use Sector". *Mexico Federal Government,* http://www.sener.gob.mx/webSener/res/476/Average%20Price.pdf; Sophie Tremolet and Joanna Neale, "Emerging Lessons in Private Provision of Infrastructure Services in Rural Areas.Water and Electricity: Services in Gabon." *Environmental Resources Management Report* (2002): 11.

19. Phil Fouracre, "Social Benefits of Transportation," *Rural Transport Knowledge Base* (2001): 4-6.

Box 4: Intermediate Modes of Transportation

Intermediate Modes of Transportation (IMT) are lower-cost options that bridge the gap between automobiles and foot travel.[1] Mopeds, motorcycles, bicycles, hand carts, or taxi services are all considered IMTs. Current policy in Mexico at the state and federal level is supportive of road modernization efforts to the potential exclusion of IMTs.[2] Supporting the development of a more complete transportation network would require a bottom-up approach to transportation policy formation. Principally, this entails promoting IMT ownership and use, expanding affordable public transportation, and creating paths and roadways for non-automobile transportation modes that are both accessible to users and safe.

Road safety is another important factor in promoting a robust transportation network. Traffic accidents in rural areas commonly involve collisions between cars and pedestrians or users of IMTs, as the latter groups are forced to use roads that were not designed for their mode of transportation. This is, first and foremost, a critical public safety issue: in 2008, traffic accidents killed 60% more Mexicans than homicide. However, it also has dire economic effects as the young workers are the most likely to die in traffic accidents, and badly injured traffic victims take not only themselves out of the workforce, but their caretakers as well. To address these issues roads must be designed to accommodate users of all types – often this is as simple as providing a very wide shoulder for pedestrians and users of IMTs. Road maintenance is also an effective tool not only for public safety, but for development: pilot programs in Peru found that hiring local manual laborers to maintain rural roadways prevented a significant number of accidents while also promoting local economic growth and bringing more people into the formal economy.[3]

While the construction of modern, automobile-oriented roads is important in bringing prosperity to the SRC cities and villages, a comprehensive transportation policy must start from the ground up, understanding the needs of current users and providing an affordable and effective way for local people to transport themselves and their goods in a more convenient and efficient manner. Future policy initiatives should therefore take into account that a future growth scenario in which everyone has access to cars may never occur if users today cannot access the transportation tools they need to improve their lives.

1. Jonathan Dawson and Ian Barwell, Roads are Not Enough: New Perspectives on Rural Transport Planning in Developing Countries. (Rugby, UK: Practical Action Publishing, 1993).
2. Secretariat of Communications and Transportation, Programa Sectorial de Comunicaciones y Transportes 2007 – 2012, (Mexico City, DF: Secretariat of Communications and Transportation 2007).
3. Ana Bravo, "Making Road Sense," International Forum for Rural Transport and Development: Forum News. 8(2001): 4.

hubs. However, it is unlikely that even the more concentrated population center of Nuevo Juan del Grijalva could provide the ridership necessary to make regular bus public transportation economically feasible. To avoid this, future towns could be built with an eye towards making public transportation possible. This could be achieved through locating towns closer to larger urban areas, or through the planning of new development along relatively dense corridors to support ridership. In the absence of these networks, additional attention must be paid to supporting the transportation needs of those without access to private automobiles or public transit.

While the construction of modern, automobile-oriented roads is important in bringing prosperity to the SRC villages, a comprehensive transportation policy must start from the ground up. Planners must understand the needs of current users to provide an affordable and effective way

for residents to transport themselves and their goods in a more convenient and efficient manner, including intermediate modes of transportation (see Box 4). In order for these needs to be adequately identified, it is imperative that planning be done in a more participatory fashion. Future policy initiatives should also take into account that a future growth scenario in which everyone has access to cars may never occur if users today cannot access the transportation tools they need to improve their lives.

Conclusion

The construction of these new cities is an improvement for many in terms of their access to services such as education, health care and basic utilities. However, the delivery of services could be improved through an effective participatory approach to information gathering, implementation and evaluation of services. A participatory process will ensure that health care and education needs are met, and the affordability of other basic services, like electricity. Lastly, improving transportation services increases quality of life but also contributes to the economic success of the rural city. Public services are essential to the success of any city. However, close attention must be paid to the effectiveness of these services for the population being served.

Conclusion

As summarized more extensively in the Executive Summary, this report finds that while the Sustainable Rural Cities program has offered positive strides in advancing health care and education in the region, it does not appear to have the elements required for long-term sustainability. Several weaknesses of the program were identified in terms of the infrastructure and physical design of the new cities, their economic viability, and the program's provision of basic services. The lack of participatory planning and the lack of environmental and economic viability are the main hindrances to the overall sustainability of the settlements.

Because of these weaknesses, we do not believe that this program of rural city creation would lead to growing urban centers without strong government subsidies. In order to ensure the success of human settlements, thorough process of participation and greater emphasis on economic and environmental sustainability must be at the heart of the planning process. We believe that alternative forms of development, such as strengthening established urban centers in conjunction with a stronger rural development policy, would be more effective at meeting the goals put forth by SRC while simultaneously avoiding the high cost of relocation.

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Appendix A: Participatory Planning

Origins and Definitions

Participatory planning is an approach to planning in which governments, institutions, and community members work together to further development and bring about a more open and integrated system. It implies that through sharing responsibilities and empowering local groups, community projects can be successful and sustainable.[1] Based on key literature, community participation may be defined as

"a process by which people are enabled to become actively and genuinely involved in defining the issues of concern to them, in making decisions about factors that affect their lives, in formulating and implementing activities, in planning, developing and delivering services and in taking action to achieve change."[2]

Two major contributors to the development of participatory planning are Paulo Freire, who encouraged people in Latin America to be critical of their own education systems by a method known as *conscientisation*, and Kurt Lewin, who attempted to promote interracial understanding through democratic leadership, group dynamics, experimental learning, action research, and open systems theory during the 1930s and 1940s.[3]

According to the National Civic League, there are particular prerequisites that must exist in order for participatory planning to be effective. These prerequisites include:

- Collaborative readiness by stakeholders;
- Credible stakeholder groups;
- Representation of all sectors;
- Fair and shared decision-making;
- Commitment from participating groups;
- Support from surrounding institutions;
- Efforts made to overcome mistrust;
- Strong leadership;
- Small interim successes; and an
- Eventual shift to broader concerns.[4]

These prerequisites are relevant in varying degrees depending on the level of participation appropriate for different projects, although in all situations there is an inherent potential

1. Pierre Lefevre, Patrick Kolsteren, Marie-Paule de Wael, Francis Byekwaso, and Ivan Beghin, "Comprehensive Participatory Planning and Evaluation," Tropical Medicine Nationalestraat 155 (December 2000): 3.
2. Tsouros, 10.
3. Fred Fisher, Building Bridges Through Participatory Planning (Somalia: UN Habitat, 2001), 8.
4. Ibid 13-14.

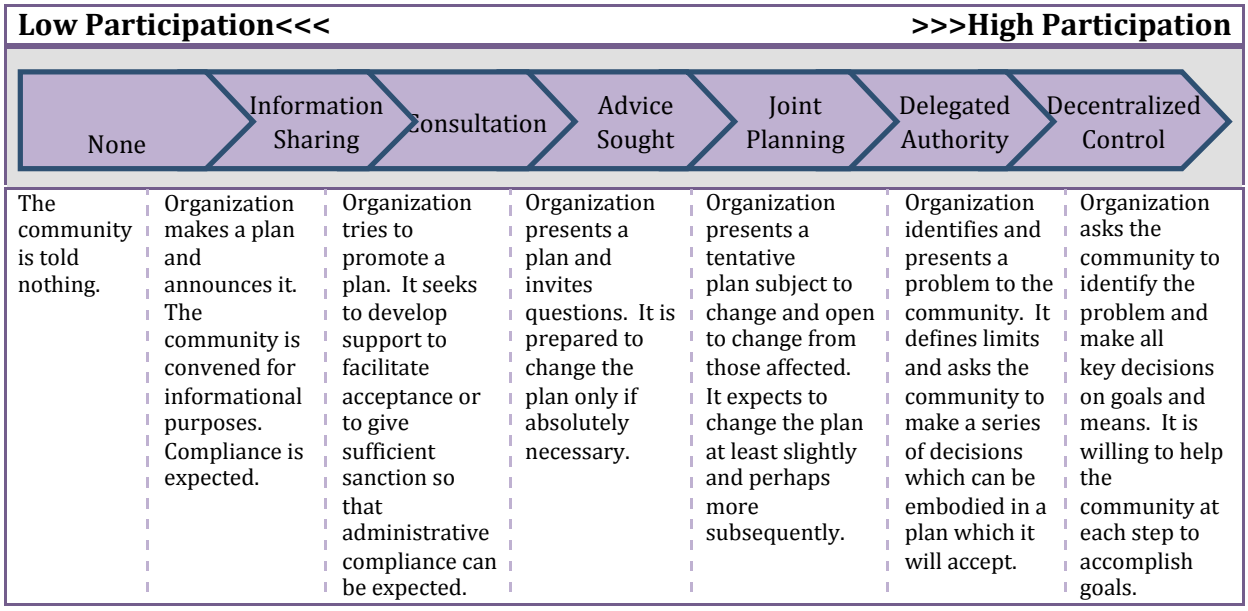

Figure 1A: Ladder of Community Participation

for community participation.[5] These levels of participation vary from no involvement to decentralized control.[6] Figure 1A above lists the different degrees of participation, along with illustrative methods and examples.[7] Participatory planning has gained importance following several failures of top-down approaches to development and is considered a predominant development approach today.[8] Community-based approaches to development have been "among the fastest growing mechanisms for channeling development assistance. According to a conservative estimate, the World Bank's lending for CDD (community-driven development) projects has gone up from $325 million in 1996, to $2 billion in 2003."[9]

Best Practices and Recommendations

Within participatory planning literature, several key themes have emerged pointing to common practical approaches and best practices to empower community members. We have highlighted some of these major ideas below:

First, participation is best seen as a holistic idea that is long-term in nature. It is considered desirable to have the community involved in the entire participatory process, even if only a specific degree of participation may be relevant to a particular development project. [10]

5. Abraham Wandersman and Gary A. Giamartino. "Community and Individual Difference Characteristics as Influences on Initial Participation". American Journal of Community Psychology 8, no. 2 (1980): 226.

6. George Brager and Harry Specht. Community Organizing (New York: Columbia University Press, 1973), 113.

7. David Brueur, "Community Participation in Local Health and Sustainable Development: Approaches and Techniques," European Sustainable Development and Health Series 4 (2002): 14.

8. Asim Khwaja, "Is Increasing Community Participation Always a Good Thing?," *Journal of the European Economic Association 2,* no 2-3. (2004): 427.

9. Ghazala Mansuri and Vijayendra Rao, "Evaluating Community-Based and Community-Driven Development: A Critical Review of the Evidence,"*Working paper, Development Research Group of the World Bank* (2003): 2.

10. LogoLink, "The International Workshop on Participatory Planning Approaches for Local Governance," http://

Second, a successful participatory planning approach must be transparent, accountable, responsive, and inclusive. Since the process involves the community, the community should be kept well-informed of developments through multiple channels of communication like weekly meetings, newsletters, and social organizers.[11] Vibrant communication ensures that the community trusts the political will and capabilities of the government. Government institutions and officials need to display open attitude and maintain transparency in their dealings with local communities to garner their trust.

Third, both the community and the local government need to understand the context in which participatory planning can be successfully implemented. This includes acquiring the skills and capabilities necessary for an effective participatory process. [12]

In rural communities, the likelihood of participation in community-level user groups is greater for those who are economically and socially better off and have greater access to government offices and officials related to decentralization policies. This analysis supports the argument that it is important to build institutional mechanisms that encourage poorer and more marginal households to access government officials, improve access to educational opportunities, and create incentives to promote more interactions between less powerful rural residents.[13]

Fourth, participatory planning initiatives need to cater to the genuine interests of the community. This not only ensures that the initiatives will be well received, but also provides access to vital community resources and knowledge bases which are integral for the implementation of local plans.[14]

Fifth, participatory planning has numerous advantages such as strengthening communities, empowering people, and increasing the chances of implementation and success of the development programs. Nonetheless, the participatory approach to development may need to be applied along with other instruments such as broad-based agricultural reforms or large-scale technical infrastructure projects.[15]

Table 1A presents some best practices from across the world where organizations and governments have successfully adopted the principles of community participation in their development projects.[16]

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www.logolink.org/resources/downloads/ Indoz-Conf-Final-Web.pdf (accessed 5 December 2010).

11. Norman Reid. *Community Participation: How People Power Brings Sustainable Benefits to Communities.* (Washington: USDA Rural Development , 2000), 4.

12. Logolink, 5.

13. Agrawal, A. and K. Gupta (2005) 'Decentralization and Participation: The Governance of Common Pool Resources in Nepal's Terai'. *World Development,* Vol. 33, No. 7, pp. 1101–1114.

14. Norman Reid. *Community Participation: How People Power Brings Sustainable Benefits to Communities.* (Washington: USDA Rural Development,2000). http://www.rurdev.usda.gov/rbs/ezec/Pubs/ commparticrept.pdf,6.

15. Khwaja, 434.

16. Information of the Table is from Health Organization. *Community Participation in Local Health and Sustainable Developmen*t (http://www.euro.who.int/__data/assets/pdf_file/0013/101065/ E78652.pdf, 21-75).

Table 1A: The Action Planning Cycle

Stage of Cycle	Methodologies/Techniques	Case Study Examples
Assessing Needs and Capabilities	*Community profiles and appraisals*: Survey and analyze the needs and resources of the community	Belfast, Northern Ireland: Health profile of the Greater Shankill area
	Study community uniqueness: Explore local distinctiveness and express community values	Lithuania and Romania: Parish mapping to empower communities
	Rapid participatory appraisal: Assess needs, problems and preferences quickly through efficient broad-based participatory research	Croatia: Rapid participatory appraisals to produce health profiles in the cities of Pula, Metkovic and Rijeka
Agreeing on a Vision	*Awareness and future workshops*: Form objectives, select priorities and link to current state of affairs	Newly independent states of former USSR: Shared vision and practical immediate action for improving urban health in medium sized cities
	Guided visualization and Future search: Identify and communicate future scenarios within a pre-drafted strategic planning process	Milwaukee, Wisconsin: Aim to reduce inequality, address systemic racial discrimination and achieve health goals
Generating Ideas and Plans for Action	*Modeling and simulation*: Use techniques ranging from small-scale to full-scale modeling in laboratory or informal settings in order to engage communities in thinking about their built environment	Potsdam-Babelsberg, Germany: Planning for regeneration program for the town
	Work book method: Engage planners and communities to discuss basic city and neighborhood planning and development issues	Sundsvall, Sweden: Involve residents and municipal staff in improving environment
	Citizens' juries: Involve community in debating and evaluating specific issues, proposals or plans	Tuyen Quang, Vietnam: Participatory Resources Management Project (PRMP)
Enabling Action	*Community networks*: Enable interaction among community members to develop mutual support structures and community action forums	Veracruz, Mexico: Self-managed networks of farmers/rural communities
	Community advisory groups and councils: Liaise between a single collective community voice and municipal authorities or other stakeholders	Gujrat, India: Joint management of forestry regions with developers, conservators and communities
	Local workers: Resource grassroots work and local action wherever possible	Karachi, Pakistan: Orangi Pilot Project sourcing finance and labor resources from the community
	Theater of the oppressed: Symbolize and express ideas and feelings (particularly of minority, oppressed, underprivileged or marginalized groups) using arts forums, theater, communal events	London, England: Cardboard Citizens Theater Group comprising people who have been homeless
Monitoring and Evaluating	*Case studies*: Develop successful case studies of successful strategies and outcomes to disseminate to the community	Aga Khan Development Network, particularly in India (states of Andhra Pradesh, Gujarat, Madhya Pradesh, and others)
	Community indicators: Simplify, measure and communicate information about key issues	Bremen, Germany: The Sustainable Community Indicators project
	Framework and benchmarks: Develop framework and identify benchmarks of success	Saskatoon District Health, Canada: developing framework and benchmarks for community development practice

Exploring Cases of Good Governance for Participatory Planning

Development literature on the topic of governance presents the idea that participatory local institutions and strong institutional frameworks–local, regional and national–enables the development of disenfranchised communities and empowers them.

A 2007 UNESCAP report states that adherence to good governance is essential to making strategies for basic service provision and poverty reduction effective and sustainable. It considers nine principles of good governance:

- inclusiveness and equity,
- participation,
- transparency,
- efficiency,
- effectiveness,
- subsidiarity
- adherence to the rule of law,
- accountability, and
- sustainability.[17]

Good governance ensures that poor and other disadvantaged groups are included in the decision making process regarding the provision of services that affect their lives and about the objectives of the resulting policies and programs. Their inclusion and involvement also empowers them to become agents of their own development and to participate in other relevant areas. The principle of subsidiarity states that a task or action that could be delegated to a small and simple local organization should not be carried out by a large complex organization.

The adoption of a rights-based approach to development by governments can ensure that inclusiveness, equity and the other participation principles will ultimately lead to a more sustainable community driven development. International Fund for Agricultural Development (IFAD), a UN specialized agency dedicated to eradicating rural poverty in developing countries strongly believes that when people have a voice in the designing and the monitoring of rural development projects, public resources intended for improving productivity are less likely to be diverted for "non-productive" purposes. This is one reason why IFAD insists on the inclusion and capacity-building of community-based organizations as a constituent element in virtually all of its projects.

Some examples of how IFAD incorporates its decentralized and participatory planning approach in rural development projects are illustrated below:[18]

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17. Access to Basic Services for the Poor: The Importance of Good Governance, United Nations Economic and Social Commission for Asia and the Pacific UNESCAP Publication, 2007

18. This section is based on: Van de Sand, Klemens. 2000. "Promoting Good Governance: IFAD's Decentralized

- In Sudan, IFAD projects focus on building the capacity of village communities to plan and implement sub-projects that enhance on- and off-farm income and provide access to rural financial services.
- In Syria, groups of beneficiaries, cooperatives, and traditional associations are involved in all stages and aspects of implementing the Badia Rangelands Development Project.
- In El Salvador and Paraguay, rural districts have worked with the national government and Congress to enact specific laws related to promoting rural credit and the establishing trust funds that enable access to financial services for the rural poor.
- In Chile, local development councils, comprising representatives of the rural poor and of regional and central governments, have been established in order to select and coordinate public investments in rural areas.

By employing these forms of participatory planning approaches, other countries have been able to assemble a more informed citizenry and in effect strengthen the viability of each community. The SRC program could benefit substantially from having similar fortifications influenced by the assurance of an inclusive local government.

Approach."UN Chronicle 37, no. 1: 90. Military & Government Collection, EBSCOhost (accessed November 24, 2010).

Appendix B: Green Building Design

This Appendix summarizes some of the basic elements of Green Building and provides examples of materials for constructions that are considered environmentally sound under the framework. Future SRC efforts would greatly benefit from the integration of principles of Green Building as part of an overall effort toward affordable sustainability.

The information is mainly from an actual project prepared by Ricardo R. Ramos Chue, an architect by trade. Ramos is also a Quality Assurance Specialist in construction projects, is American Concrete Institute (ACI) certified, and also is a member of the United States Green Building Council (USGBC)-Upstate NY Chapter.

Green Building is a recent design philosophy that takes into account resource depletion and waste emissions as part of the entire life cycle of a construction project. The approach seeks to mitigate environmental externalities through conservation of resources, reduction of and planning for waste, minimization of life cycle costs, and creation of a healthy environment.

As a green building architect, Ramos expressed his concern about the removal of topsoil, excessive tree-clearing, and potential soil erosion problem within the SRC communities.[1] These practices are environmentally hazardous, though they are prevalent in developing countries. According to USGBC-LEED, the damages and costs incurred by such practices remain for several years after the project has initially started because the restoration of a site's original conditions takes far longer than expected, as most logged trees in greenfield areas are often old.[2] Furthermore, if resodding is not conducted as part of an effort towards sustainable sites, and if trees are not replanted with an equal quality native tree at an ideal ratio of 1 to 1, the soil conditions will continue to deteriorate further.

This photo was taken in October 2010 in Nuevo Juan del Grijalva.

Following the replanting of trees, other efforts must be made, including terrain preparation to deal with gradation and slopes, placements of geo-textile sheets, rip-rap works, implementation of storm drainage, and finally resodding, which can be easily and economically placed by hand.

1. Interview with Ricardo R. Ramos C., Cornell University, Ithaca, NY. December 6, 2010.
2. LEED-GBES-GBCI- Study Guides (MP3), cited by Ricardo R. Ramos C., 2010.

Additionally, failure to include a process to mitigate this deterioration could also produce eroded terrain and construction contaminants, which enter the waterways and pollute the entire ecosystem. Such practices should be avoided if at all possible.

This is particularly relevant for Santiago el Pinar and Nuevo Juan del Grijalva, and in fact in general for Chiapas, where many regions face risks of landslides and consequently soil erosion. Risks of landslides are increasing in many tropical regions due to changes in climate and weather patterns around the world. Apart from disrupting human life and causing damage to settlements, landslides are also one of the causes of soil erosion that may have several detrimental ecological impacts.[3] The chances of landslides and rates of soil erosion generally increase in the presence of deforestation, unstable soils, and steep slopes.[4] Currently, there are several initiatives to raise awareness of landslide risks and to develop prevention programs, such as those by Instituto Nacional de Investigaciones Forestales y Agropecuarias (INIFAP) in the states of Chiapas and Oaxaca (one example would be Ejido Mexiquito in Chiapas). These high landslide and soil erosion risks can largely be avoided if considered within the planning phase and addressed appropriately in the city construction phase envisaged under the SRC program.

Another concern that Ramos shared was how SRC manages waste. The State Government of Chiapas reports that garbage collection services are operated in Nuevo Juan del Grijalva and that a solid waste landfill is under construction.[5] From the perspective of Green Building, it is crucial to note that a landfill can cause ground water contamination and a myriad of additional health problems for local residents if it is not well managed. Green Building strategies promote waste classification, recycling, and appropriate landfill management. Waste management is also closely related with the development and economic spheres; recycling activities, for instance, can create jobs for the community and, through involvement and education, may foster a more sustainable lifestyle.

Finally, it is important to note that the success of Green Building projects highly depends on the strength of open communication and inclusion of the community within the process. Community members are key players in answering questions such as how houses should be built; what potential alternative energy there might be; whether environmentally friendly materials have been applied; whether the same goals have been shared between citizens and the government; how responsibilities within the neighborhoods should be allocated; whether ground rules set in the contract have been respected and successfully implemented; and even how regulations, such as restrictions on cars inside the village, are enforced.[6]

Planners and architects should also be aware of other forms of sustainable and productive collaborations with communities, which greatly help reduce the degree of environmental

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3. Cruden D.M. and D. J. Varnes (1996) - Landslide types and processes. In: Turner A.K.; Shuster R.L. (eds) Landslides: Investigation and Mitigation. Transportation Research Board, National Research Council, Special Report 247, pp 36–75. National Academy Press, Washington, DC.
4. Institute for Natural Resources. Oregon State University. Accessed December 14, 2010. http://www.oregonexplorer.info/willamette/LandandPeople/Landslides-Erosion
5. The State Government of Chiapas 2009, 346-7.
6. Interview with Francis Vanek, Cornell University, Ithaca, NY. December 6, 2010.

degradation. These collaborative works include sharing organic produce, cooking food together, sharing the laundry rooms through a schedule, and organizing groups to take care of the harvesting. Thus, building trust within the community is a key phase, especially when it comes to designing Green Buildings. Building community ties, however, may require some residents to alter their previous lifestyle and behaviors.

The following Table lists suggestions of Green Building materials. It is intended to provide affordable options with particular attention paid to Green Building concepts.[7] These designs could be useful for implementing Green Building philosophy and practice within the SRC framework.

Table 1B: Essential Activities for Green Building Design[8]

Activities	**Green Building Design Suggestions**	
Land	Close to natural water sources	Non-contaminated land
	Close to public transportation	Non-deforestation /construction
	Economic parcel (10.00m x 30.00m)	
Foundation	Green concrete blocks (ACI)	New technologies (Amvic)
	Green concrete pouring for ground & deck (ACI)	Structure (hardwood & metal)
Utilities	Air conditioning and exhaust systems	Plumbing fixtures & hardware
	Electrical & communication pipelines	Plumbing pipelines
	Electrical equipment, accessories, & grounding	
Envelope	Hardwood (structure)	Straw fiber boards
	New technologies (Amvic, Steico)	
Roofing	Clay shingles (locally made)	R-14 insulation material (Amvic, Steico)
	Metal sheets	Roof natural ventilation system
	Metal structure (Steico)	
Green Systems and Special Devices	Ceiling fans	Lightning protection system
	Drinking water tank	Organic digester equipment
	Electric duplex outlets	Passive solar energy system – electricity
	Electricity saver device	Passive solar energy system – hot water
	Fluorescent light fixtures (CFL)	Rain water treatment & reservoir
	Kitchen adobe stove & oven – biogas	Waste water system (black water) – biogas
	Kitchen exhaust & ventilation system	Waste water system (gray water) – irrigation
	Kitchen sink garbage disposer	

7. Household components are Type A and B in compliance with the US Environmental Protection Agency (EPA), US Green Building Council (GBC), and Leadership in Energy and Environmental Design (LEED).
8. Ricardo R. Ramos C., Oct 22, 2010.

Appendix C: Housing Design

Figure 1C: Housing Design in Nuevo Juan del Grijalva

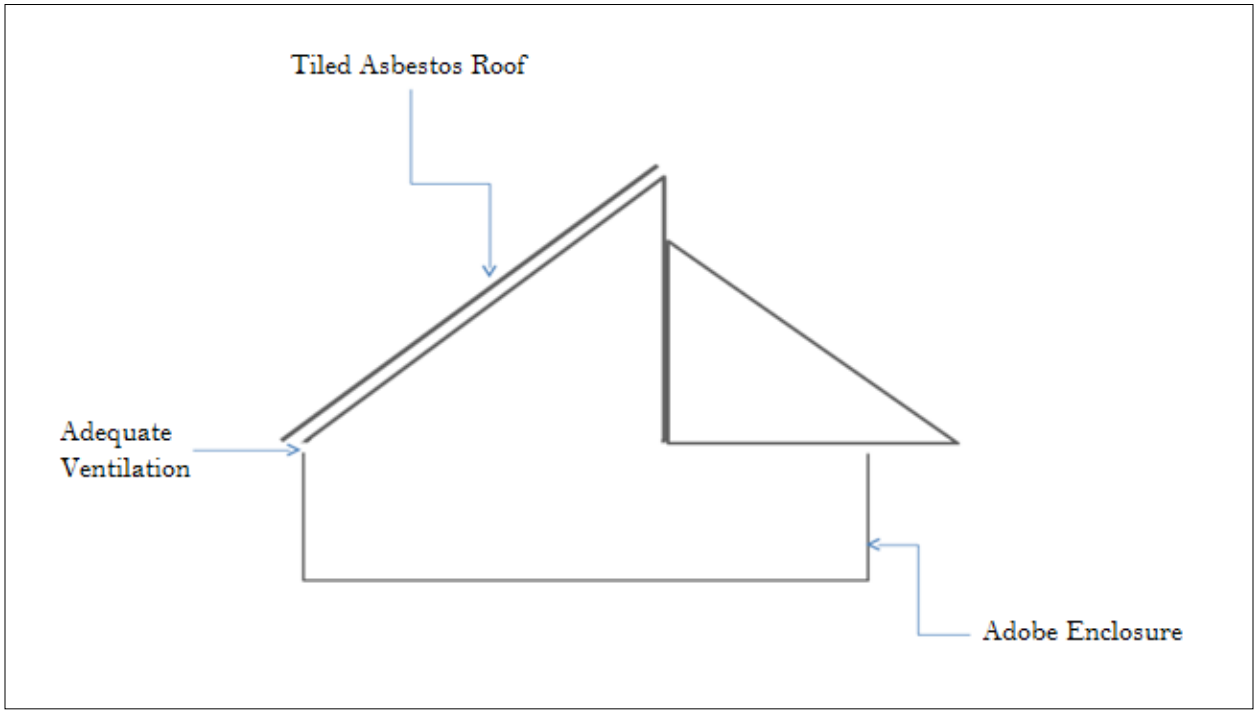

Figure 2C: Housing Design in Santiago el Pinar

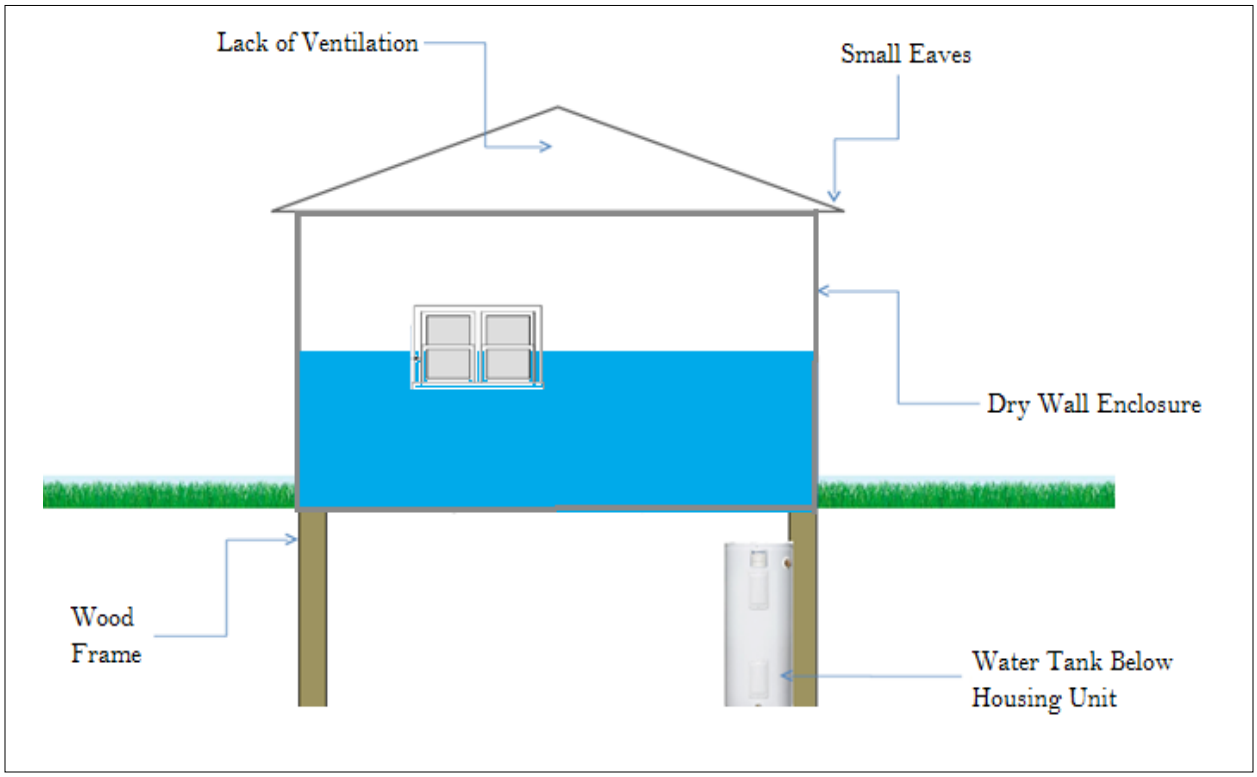

Figure 3C: Proposed Improvements to the Ventilation System and Roofing Structure in Santiago el Pinar