UNDERSTANDING RESILIENCE IN URBAN SLUMS: LESSONS FROM PEDDA-JALARIPETA, INDIA

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Slums are typically perceived as substandard eyesores, corrupt, makeshift, impoverished and crime-ridden. The growing literature on resilience challenged these perceptions, and promoted new debates on their ingenuity and adaptability to overcome external circumstances. Yet these debates are often limited to short term coping and adaptive capacity of slum dwellers. In this paper we look at long-term transformation of a slum over a forty-year period. Holling's Adaptive Cycle model is a useful tool to study the transformations occurring within a slum. The four phases of the adaptive cycle are: conservation (K), creative destruction/release (Ω), reorganization (α) and exploitation (r). The Ω and α phases are together known as the "backloop" and are the focus of this paper. This paper explores how the residents of Pedda Jalaraipeta slum in Visakhapatnam use their social capital (bonding, bridging and linkages) to survive and recover from disasters. Based on empirical ethnographic findings, this paper shows that when slum dwellers collaborate with government or non-government agencies their community can recover and retain its unique social and cultural identity.

Keywords: Resilience, Adaptive Cycle, Social Capital, Bonding and Bridging, Linkage capital

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Introduction

In developing countries, nearly one billion people live in urban slums, their numbers are projected to grow by 500 million between now and 2020. Slums are growing the fastest in Sub-Saharan Africa, Southeastern Asia, and Western Asia (World Bank, 2013). Slums or informal settlements are a core feature of urbanization in the global south. The growth of slums is attributed to large-scale urbanization coupled with a lack of affordable housing (UN-Habitat, 2003). Given their prevalence across the world, informal settlements are receiving increased attention from planning professionals and academics. Special issues dedicated to informal urbanism were published in several international journals including *Planning Theory and Practice* (2011), *Built Environment* (2011), *City (2011),* and *International Development Planning Review* (2012). This recent explosion of research created a rich database of empirical and theoretical research articles aimed at exploring new ways of thinking about informal urbanism.

There however exists a gap in research on slums in terms of their resilience and social capital. Statistics about poverty do not give a holistic understanding of the quality of life in informal settlements and challenges faced by the residents on a daily basis (Satterthwaite & Mitlin, 2014, p. 10). Using a resilience lens to study and observe these slums will allow us to learn how these communities use their limited resources to fight external threats. The adaptive cycle model of resilience is among the first models that have been applied to study the resilience of a socio-ecological system. It has been used to study retention of ecological knowledge among local communities (Madzwamuse & Fabricius, 2004), management of rangeland ecosystems (Abel *et al.*, 2006), fisheries (Folke *et al.* 2004), and forest governance in public lands (Beier *et al.,* 2009). The model was also used to study social systems such as urban areas (Chelleri, 2012), and climate change disaster in cities (Pelling & Manuel-navarrete, 2011).

In this paper, we will use the Adaptive Cycle model to study the resilience of the Pedda Jalaripeta slum in Visakhapatnam, India. The model will allow us to conceptualize and operationalize resilience in urban slums. Like most urban slums, the PJ slum witnessed a myriad of disasters over the past four decades. In 1983 a fire destroyed two thirds of the PJ slum and the community was rebuilt after the disaster. Starting in early 2000, the PJ slum has witnessed an avalanche of tourism-oriented development within the Coastal Protection Zone (CRZ) that threatens the coastal ecosystem and the community's livelihood (fishing). The PJ community, not only survived these natural and man-made hazards, but it has moved to a better economic, physical, and social standing in the past four decades. The analysis of these changes in relation to issues of resilience have revealed possible long-term transformative resilience of an urban slum and offered significant insights regarding the role of social capital in the ongoing resilience of an urban slum.

The next section identifies six definitions of resilience commonly used in urban planning literature and elaborates why we chose the adaptive cycle definition to analyze the PJ slums. The subsequent section presents the qualitative research methods that were used to collect data in the PJ slum. Next section chronologically narrates the history of the PJ slum and elaborates the challenges that the community faced and survived over the past forty years. The conclusion reflects on how resilience was manifested in a remote slum in coastal India.

Resilience and Slums

In his seminal article on resilience, Holling (1973) challenged the command and control approaches to ecosystem management advocated by the ecologists of the time. He dismissed the idea that ecosystems organize around a single equilibrium point to which a system will automatically return following a disaster, and outlined a new ontology of ecosystems rooted in the complex adaptive systems debate (Holling, 1973). After its initial introduction in ecological thinking, the concept of resilience has gained traction and prominence across several disciplines such as disaster and crisis management, climate change, and urban planning. Resilience thinking, although ubiquitous, is far from being accepted as a normative urban planning theory. The multiple meanings and interpretations of resilience create a rich interdisciplinary scholarship in urban planning literature (Andavarapu & Arefi, 2015; Desouza & Flanery, 2013; Rogers, 2012)

Urban planning scholars frequently use the following five interpretations of resilience: *Engineering resilience*, refers to bouncing back to pre-disaster conditions (Campanella, 2006; Haigh & Amaratunga, 2012). The *equilibrium resilience* definition refers to the pursuit of a preferred alternative rather than bouncing back to the original state(Arefi, 2005; Pickett *et al,* 2004). The *evolutionary resilience* definition challenges the whole notion of equilibrium and suggests that it is in the nature of the system to evolve and change with or without external disturbances (Davoudi *et al.,* 2013). *Community resilience* refers to the development of personal and collective capacities of communities to respond and influence change to sustain and renew the community (Magis 2010). A*daptive cycle* (Figure 1) definition, posits that socio-ecological systems go through four phases of development in their life cycle: conservation (K), creative destruction/release *(Ω)*, reorganization *(α)* and exploitation/growth *(r)* (Gunderson & Holling, 2002).

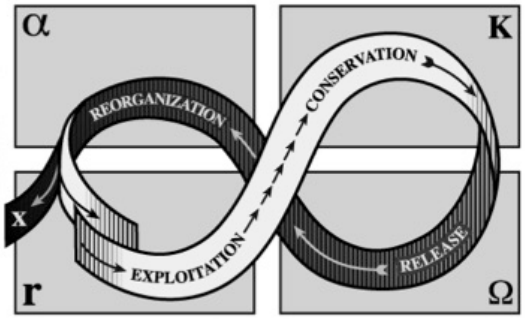

Figure 1: Adaptive Cycle Framework Source: Holling & Gunderson (2002), p.34. Reproduced by permission of Island Press, Washington DC.

Some scholars argue that adaptive cycle is not an appropriate framework for studying slums, since they are not eco-systems (Dovey, 2012). Despite the controversy surrounding the nomenclature, the *adaptive cycle* definition incorporates both the long-term and short-term challenges that the slum dwellers face on an ongoing basis. More importantly, this definition accurately describes how communities can survive and reinvent themselves after multiple disasters. Applying the adaptive cycle framework to slums/informal settlements, we can see that exploitation (r) occurs when the first hut is built on a vacant land. The settlement then enters the conservation phase (K) as permanent structures are added; residents create new norms and networks for their community, and over time improve their social capital (Dovey, 2012). New linkages with external agencies are formed. Informal settlements can continue in this stage for a long time, but in some cases, creative destruction (Ω) phase might occur when the community is threatened by man-made or natural disasters.

When that happens, the community enters the reorganization (α) phase, when a new order may begin to appear. It is in this phase that the community's social capital is tested: the residents may use their linkage capital to formalize their slums and gain tenure security. On the contrary, during this phase, the residents can be displaced or the settlement can spiral downward as a dangerous slum (Dovey 2012, p. 356).

Social networks within slums as well as linkages to external agencies often play an important role in the recovery and reorganization of a slum area after a disaster (Islam & Walkerden, 2014). There are three types of social networks: bonding, bridging and linking. Bonding ties are shared between individuals who share the same ethnic and religious identities. These networks typically represent relationships between immediate family members and relatives (the in-laws, their sons and daughters). Bridging ties are described as social relationships of exchange, often of association between people with shared interest or goals but contrasting social identity. Both these ties represent the internal horizontal linkages within the community (Islam & Walkerden, 2014; Pelling & High, 2005). For slums (and communities with low socio-economic status) bonding social capital allows them to "get by" but without connecting to external agencies they have difficulty getting ahead (Aldrich, 2011; Arefi, 2009; Woolcock & Narayan, 2000).

Linking ties are a sub category of bridging ties, these relationships cross group boundaries in a vertical direction. Linking networks can provide political, economic, or knowledge-based support to slum residents. The linking networks often provide the community with much needed resources not just to recover and bounce back but also transform the communities to a better physical state. The bonding/bridging/linking triplet provides a valuable explanation as to why certain slums fail to survive a disaster while others continue to be resilient despite multiple disasters.

Slums can be resilient when they create an atmosphere for individual growth without interrupting the existing social networks, or disturbing access to ecological resources. The survey of the existing literature shows that four forms of capital (*physical*, *human*, *social*, and *ecological)* are critical for resilient slums (Adger, 2012; Andavarapu and Edelman, 2013; Arefi, 2009; Perlman, 1976; Roy, 2003). The *physical capital* refers to infrastructure, i.e., water, sewer, roads, and electricity. Access to educational services (schools, anganwadis[1]), and hospitals supports *human enrichment*. *Social capital* includes the social networks within and outside the community. Resources such as fishing, urban forest, and life stock represent *ecological capital*. In the next section we select a resilient slum in the City of Visakhapatnam based on these four forms of capital.

Operationalizing Resilience and Selecting a Resilient slum

Of 1.7 million residents in the city of Visakhapatnam, 770,971 (44.1%[2]) live in slums. Land is a valuable and scarce resource in the city since it is landlocked (Sea Coast on the west and hills on the east side). Low skill work opportunities in the city such as, the Naval Port, Steel industry and the growing tourism industry, attract rural migrants to

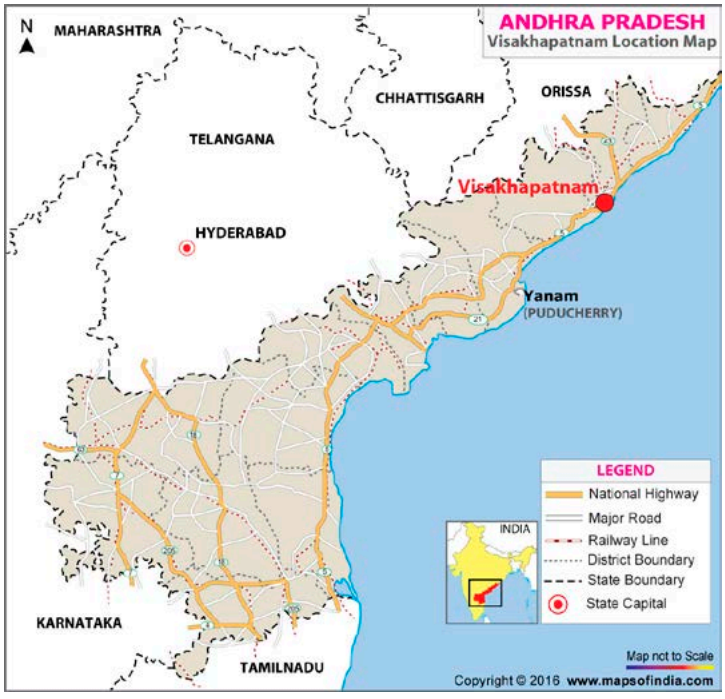

Figure 2: Location map of City of Visakhapatnam Source: Maps of India.com

[1] Government funded day care centers, which are usually run by two anganwadi workers. These centers provide a variety of services including prenatal and antenatal care to pregnant women; providing supplementary nutrition to both children below the age of 6 as well as nursing and pregnant women; and pre school education to children who are between 3 to 5 years old (Website of Ministry of Poverty Alleviation, India).

[2] 2011 Indian Census data on Slums accessed on 2013-08-02 from http://www.census2011.co.in/census/city/402-visakhapatnam.html.

Visakhapatnam further exacerbating the land scarcity and thereby increasing slums. In 2009, the Greater Visakhapatnam Municipal Corporation (GVMC) conducted a household survey of all the 654 slums in the City. This database was available online and provided information such as the physical infrastructure of the slum, and the demographic and economic profiles of the slum residents (GVMC, 2009). Additional data were accumulated through review of scholarly publications and newspaper articles.

A methodological review of the database on slums in Visakhapatnam revealed that the Pedda Jalaripeta (PJ) slum – the largest (6,000 residents) and oldest slum in the city – had strong stocks of physical, social, human and ecological capital. Nearly all (92.9%) the houses in the PJ slum are located along paved roads, and all the residents have electricity connections. 75% of households have access to tap water and less than 50% have pour-flush toilets on premises. This data demonstrates that the PJ community has access to basic infrastructure (*Physical capital)* (GVMC, 2009). The community also has access to educational services (Anganwadis and schools) and health care (*Human capital)*. The PJ has a publicly accessible beach (*Ecological capital),* which provides a livelihood (fishing) to 70% of the PJ residents (Figure 3) (Immanuell & Rao, 2012). The majority (70%) of the residents in the PJ slum belong to the Jalari caste generating a strong homogenous community with tight knit social networks (Equations, 2008; Philipose, 2013).

Figure 3:
Aerial view of Pedda Jalaripeta slum in Visakhapatnam
Source: Google Earth

Popular media often portrays slums as dirty and filthy where the streets are filled with raw sewage and the houses are nothing more than shacks. The PJ community description provided here does not resemble the image of a slum portrayed in the popular media. Despite its outward appearance, the PJ slum continues to struggle with issues such as poverty[3] and poor infrastructure[4] and is therefore officially notified as a slum by the GVMC.

Research Approach and Methods

Between September 2013 and March 2014, we collected preliminary data about the PJ slum through a variety of data bases including: GVMC's household surveys (GVMC, 2009); Department of Fisheries socio-economic survey on the fishermen in the PJ slum (Immanuel & Rao, 2012); NGO Action Aid project reports outlining their programs and successes in the PJ slum (Phillipose, 2013); and other scholarly articles about the city of Visakhapantam and the PJ slum. In February 2014, University of Cincinnati's, Institutional Review Board (IRB) reviewed and approved the PJ slum research protocol. We conducted the fieldwork in the PJ slum from March thru July 2014. During that time 54 interviews (44 with slum dwellers, 10 with government employees) and 3 focus group discussions were held. The perspectives of local leaders were canvassed through multiple key informant interviews. Additionally, ethnographic observations were recorded on a daily basis in a journal. During this time an average of 15 hours per week were spent on interviews and participant observations.

The researcher engaged three key informants (AT, TS & TJ) one in each of the three main cohorts in the PJ slum (senior fishermen, young fishermen, and women within the community). These three key informants were well respected in the community and helped with recruiting other interviewees to the research. Four research activities were conducted in this research study:

1 Interviews with government officials and representatives of NGOs

Ten semi-structured interviews were conducted with government officials who work with the slum residents on an ongoing basis. Our questions were focused on the evolution and history of the PJ slum, the government funds and projects in the region over the past forty years. We also aimed to understand the interaction or lack thereof between the government agencies and the slum residents. This first round of interviews aimed at understanding the government agency's perspective about the PJ slum. From the Department of Fisheries

[3] The international poverty rate is $1.25 per day per person (UN-Habitat, 2010). In 2009, 96.8% of the PJ slum residents earned Rs. 6000 per month for a family of four representing a $0.80 per person per day(at a conversion rate of $1=Rs. 62.22) (GVMC, 2009).

[4] Over 50% of the residents in the PJ slum do not have toilets and use the public toilets paying Rs. 2 per visit. Water is supplied only for 2 hours a day.

the interviewees included KR (Joint Director); LR (Director); SR (Field Development Officer); DY (Field Development Officer), and from the Greater Visakhapatnam Municipal Corporation the interviewees included VK (Capacity Building Training Coordinator); UR (Urban Community Development Officer); SK (Anganwadi Teacher); RN (Assistant City Planner); VR (City Planner); and CL (Zonal Engineer). In addition to the government employees, we interviewed the leader from three key institutions in the PJ slum: Grama Sabha (TP); Marine Co-operative Society; and Fishermen Youth Welfare Association (FYWA)). These face-to-face interviews averaged 45 minutes and were conducted in Telugu language (local language). From the Grama Sabha we interviewed GR (Secretary) and PR (president); from the Marine Co-operative Society we interviewed AT (Past President), who is one of the key informants for this study and AN (President). From the FYWA we interviewed TS (President), TJ (President of the Women's co-operative wing), BT (Treasurer) & ANN (Secretary). TS and TJ are also key informants of this study.

2 Informal interviews with slum residents in their homes

Informal interviews were conducted with slum residents. These interviews were 20-45 minute and were conducted in Telugu but were translated and transcribed in English. These interviews were informal and conversational, but were designed to gain an understanding of resilience and social capital within the community.

3 Focus Groups

During informal interviews, the community members usually huddled together, discussing research questions or narrating a story about their community. These informal conversations among the residents were more organic and lively; the residents felt more comfortable sharing their experiences and stories in this setting. After observing these interactions among the residents we conducted three focus groups with the older fishermen, women and younger fishermen in the community.

4 Ethnographic observation in public parts of the PJ slum

The ethnographic observation component of this study included observing the spatial layout of the community, use of public/private space, participation in religious festivals (polaramma jatara), and social gatherings. The researcher attended several community affairs such as public information meeting organized by the Department of Fisheries; Marine co-operative society elections; women's micro-savings group meeting, and the executive board meetings of the Fishermen Youth Welfare Association (FYWA). Observations from these encounters were entered in a digital journal, these entries were organized as three themes: use of public/private space, social gatherings, interaction between the community members and government agencies.

The First Cycle: conservation, creative destruction/release, reorganization and exploitation

The data collected in the field shows that over a forty-year period, the PJ slum transitioned from small fishing village with no amenities to a low-income urban neighborhood with adequate physical, human, social and ecological capital. During this period it faced both natural and man-made disasters, in this section and next, we narrate the history of the PJ slum through the adaptive cycle lens.

Conservation (K) phase of the adaptive cycle is characterized by stability, certainty, reduced flexibility and low resilience: In 1969, GVMC first officially notified[5] the PJ community as a slum. At that time, the PJ community was a fishing village with no infrastructure and all the residents in the community were fishermen.

Release (Ω) phase is characterized by chaotic collapse and release of accumulated capital: On December 17, 1983, an election banner caught fire, 600 of the 800 huts in the PJ community burned to the ground.

> When our houses burned down, we ran out to the sea. Since it was winter, we were holding on to blankets and we were shivering- (Senior citizen focus group interview, may 2014). My wife was pregnant at that time so my mother took her away from the crowd, once I helped with the rescue efforts, I started looking for them, but it was so chaotic I could not find them. I finally found them away from the crowd sitting in the dark, I was very relieved to find them. (Interview with TP, April 2014)
>
> After the fire we had nowhere to live, some of us lived with our friends and relatives while other built new temporary shacks closer to the beach (Interview with AT, March 2014)

As seen in these excerpts, the PJ slum residents had to flee to the open beach on a cold December night to escape the fire, they lost their houses and their belongings to the fire.

Reorganization (α) phase is characterized by innovation, restructuring, and greatest uncertainty but high resilience: GVMC officials proposed redeveloping the PJ slum under the Visakhapatnam Slum Improvement Project (VSIP) with infrastructure and serviced lots[6]. The PJ slum residents did not trust the government officials. The slum residents

[5] A tenure formalization policy, where the state officially recognizes settlements as slums and protects the occupancy rights of the residents (Nakamura, 2014).

[6] During 1988-1996, GVMC received 9 million pounds from UK's Department for International Development (DFID) to implement VSIP. The project extended infrastructure to about 200,000 slum residents in the city (GVMC, 2012).

refused to leave their homes and rejected the redevelopment proposal. OC, who was the elected representative of the community from 1983- 88 (Member of Legislative Assembly, MLA), convinced the PJ residents that he would oversee the redevelopment efforts. Since OC was a Jalari[7] who was born and raised in the PJ community, the residents trusted him and vacated their houses (Personal interviews with TP 4/3/2014; OG 3/22/2014; and AT 3/22/2014).

Over the next few years, the MLA worked closely with the government agencies to redevelop the PJ slum. The redevelopment plan was based on John Turner's self-help slum redevelopment program, where the government provides infrastructure and tenure security to the slum residents while the residents are responsible for building their own housing (Turner, 1976). The intention of the self-help slum redevelopment program was to make housing affordable to low-income households without payment of subsidies. Therefore, the government laid out the infrastructure (water, sewer, and roads) but did not construct the actual houses.

> In 1984, the government gave us a 60 gajas of land (540 sq.feet). they gave us some rods, cement, gave us Rs. 30,000 ($500) worth of building material. So we added another Rs. 60,000 and built these houses for a total of Rs. 90,000. But not all of us got the scheme. I did not get the scheme I built my house by myself. (Interview with OG, March 2014.)

As seen in the above excerpt, the residents whose houses were lost in the fire were allotted tracts of land, building material and limited funding to build their houses. The PJ slum was redeveloped in two phases, 432 houses in the first phase (1984-85) and 50 in the second phase (1990-91).

MLA (OC) worked closely with the government officials to create a redevelopment plan that did not displace any of the residents, thereby retaining social networks of trust within the community (*social*). Houses were laid out in a grid format and a direct public access to the beach was ensured (ecological & economic resource). The *physical* infrastructure laid out as part of the redevelopment improved the drainage, sanitation and water supply in the community.

The growth (r) phase is characterized by rapid accumulation of resources (capitals): As seen in Figure 4, some of the original houses built under the redevelopment scheme are now 3 stories tall; the residents who received formal housing through the government program expanded their houses vertically to accommodate their growing families or to

[7] Prior to the redevelopment, the PJ community was primarily a fishing village where all the residents belonged to the Jalari caste (Personal Interview with AT on 3/22/2014). Jalari literally means fishermen.

rent the units as an additional income source. While 68% of the houses in the PJ slum have permanent roofing material (concrete) the other 32% are built with temporary material such as thatched roof or corrugated metal sheets, these units do not have water or sewer access and rely on public pay-to-use toilets (figure 5).

The PJ slum is a homogenous community where 88.5% of the residents belong to the 'Jalari' caste (GVMC, 2009); the shared caste and kinship groupings result in stronger bonding within the community. Previous research has established that homogenous communities tend to have stronger bonding capital (Aldrich, 2011). The PJ slum's Grama

Figure 4: *Image shows the multi-story structures in the PJ slum Source: Authors*

Figure 5: *Affordable housing in the PJ slum built with temporary material. Source: Authors*

Sabha organizes religious festivals such as the Polaramma Jatara, Nookalamma Jatara, Sri Rama Navami and other religious festivals throughout the year (Figure 6). In 2006, the Grama Sabha organized a donation campaign for the construction of the Ramalayam temple (Figure 7). The slum residents donated three days of fishing catch equivalent to Rs. 1,500,000[8]. The residents continue to donate 1% of their income voluntarily for the temple upkeep and maintenance. After the redevelopment, the PJ slum residents built four such temples through donations raised within the community.

Figure 6: Polaramma Jatara festival: animal sacrifice ritual at the entrance of the temple. Source: Authors

Figure 7: Ramalayam Temple. Source: Authors

[8] About $ 24,105 at a conversion rate of $1= Rs. 62.22

The ceremonies and construction activities increase the social capital within the community. This bonding and bridging capital is critical for the PJ slum, since the fishermen venture out 10-15 miles into the sea for offshore fishing. During these fishing expeditions, the fishermen rely on their friends and family in the nearby boats for first aid and emergency evacuation in case of an accident. The social connection that is built on the land saves lives on the sea (Focus group meeting with the fishermen dated March 30, 2014).

At the end of the first adaptive cycle, the *physical* and *human* capital of the PJ slum substantially improved while its *social* capital and access to *ecological* resources were retained. Slum redevelopments are typically notorious for disrupting the social-ecological integrity and leaving the urban poor worse off after the redevelopment (Andavarapu & Edelman, 2013; Patel, 2013; Perlman, 1976). The PJ slum avoided those potential pitfalls due to the involvement of the MLA who acted as the direct link between the community and the government. Without the MLA's (OC) involvement, the PJ slum redevelopment would have been more chaotic and could have resulted in some displacement.

The Second Cycle: conservation, creative destruction/release, reorganization and exploitation

Conservation (K) phase is characterized by stability, certainty, reduced flexibility and low resilience: 1980's physical redevelopment of the PJ slum significantly improved the *human capital* in the community in areas such as health[9], education, and birth control. The older citizens ruminate about how the PJ slum has changed in just one generation:

> Our ancestors used to go fishing on a wooden boat and they were wearing just a loin-cloth. Today, the fishermen are wearing pants while fishing, so we don't know if it's a fisherman or a student. Civilization has increased and has come into our village. (Interview with OG, March 2014.

> Yes, we developed a lot after our houses were burned. When we used to live in the thatched roof huts, we did not know anything. We were saving money, but we did not know about houses, clothes or jewelry. Back then we used to have four or five kids, now these youngsters just have one or two kids and then get an operation (family planning). (Interview with PM, April 2014).

> Civilization is increasing right so unity is increasing. Once we were not civilized, but now the younger generation is very civilized they come back from fishing wear pant and shirt and then go for a movie, drink juice. (Interview with VY, March 2014).

[9] Improved sanitation, drainage and water supply in the PJ slum reduced the spread of water borne diseases such as diarrhea, cholera etc… and improved the health of the residents especially the children (Abelson, 1996).

The above excerpts illustrate the fact that the PJ slum residents made several leaps towards urbanization in just one generation. Over the years they have incorporated urban ideologies such as education, birth control, use of household appliances as well as a sense of urban style.

Starting in 1995, Action Aid an international NGO with a focus on empowering poor urban communities started expanding in the fishing communities in and around Visakhapatnam. Action aid organized fellowship programs to educate youth in the PJ slum and other fishing communities around the City, about federal and state regulations such as the Marine Fisheries Regulation Act (MFRA)[10], Coastal Regulation Zone (CRZ)[11], Right to Information Act[12] as well as the judicial process for filing legal petitions against projects that were infringing on the rights of the fishermen and fishing communities. TS and other youth in the PJ slum, who graduated from the fellowship program, registered a NGO Fishermen Youth Welfare Association (FYWA) in 2001.

Release (Ω) phase is characterized by chaotic collapse and release of accumulated capital: Starting in early 2000 the PJ slum faced a man-made disaster, when the Andhra Pradesh state government launched several programs to convert Visakhapatnam's seacoast into a tourist destination. As part of the process, Visakhapatnam Urban Development Authority (VUDA)[13] acquired tracks of land in the City of Visakhapatnam and created Special Economic Zones to build tourism infrastructure.

In early 2000, VUDA signed a Memorandum of Understanding (MoU) with the chairman of Vizag Beach Resorts Ltd., a private company. The MoU supports development on the Visakhapatnam beach for tourist destinations such as beach resorts, discotheques (pubs), star hotels, multiplex complexes, nature care parks etc worth up to 20 billion rupees[14]. This MoU further solidified the threat against the PJ slum and its identity as a fishing village.

[10] MFRA is a 1994 Indian federal law, which created an exclusive fishing zone within eight kilometers (4.9 miles) from the shoreline for traditional fishermen.

[11] CRZ is a 1991 Indian federal law, which was revised and updated in 2011. This federal law reconciles three objectives: protection of livelihoods of traditional fisher-folk communities; preservation of coastal ecology; and promotion of economic activity that have necessarily to be located in coastal regions. The primary function of CRZ was to regulate development along the coastal.

[12] A 2005 federal law under which, any citizen may request information from a "public authority" (a body of Government or "instrumentality of State"), which is required to reply expeditiously or within thirty days.

[13] VUDA, which was created in 1978, is responsible for preparing and implementing a Master plan for the Greater Visakhapatnam region along with the surrounding suburbs.

[14] $321.44 million at a conversion rate of 62.22 rupees per dollar

The tourism plan if implemented would displace 45,000 fisher folk families including the families in the PJ slum. The first phase of the MoU project was widening the road from Visakhapatnam to Bhimli (Equations, 2008; Philipose, 2013).

Reorganization (α) phase *is characterized by innovation, restructuring and greatest uncertainty but high resilience*: In 2003, the Fishermen Youth Welfare Association (FYWA) along with the District Fishermen Youth Welfare Association filed a writ petition, against the Visakhapatnam Urban Development Authority (VUDA), in the Andhra Pradesh High Court, arguing that the road widening violated the Coastal Regulation Zone notification. The court case halted the project for three years. VUDA was forced to make some modifications to its original plan (Philipose, 2013). Eventually, the MoU with the Vizag Beach Resorts Ltd. was canceled (Equations, 2008).

> It was a CRZ violation. Firstly, the road would fall under CRZ 1, where construction is not allowed. Second a lot of fishermen used that area for drying fish and it is a source of income for us. Third there is no need for a four-lane road way from Visakhapatnam to Bhimli, there isn't enough traffic to warrant the demolition of a hill. (Interview with BG, May 2014)

BG is the treasurer of FYWA and as seen in the excerpt, the fishermen had strong case to oppose the road widening. Therefore, through filing a legal petition against the road expansion, FYWA demonstrated that the community was willing and able to fight developments that encroached on their community. Between 2000 and 2014, the FYWA filed 13 court cases against the government and private agencies for violating the CRZ guidelines.

Growth (r), is characterized by rapid accumulation of resources (capitals): Three of the top tourist attractions in the city of Visakhapatnam are in close proximity to the PJ slum: a 55 acre historical VUDA park; Tenneti Park and Kailashgiri a 380 ac hill top park and the Rama Krishna beach (RK beach) a public beach (Figure 8). Close proximity to these attractions resulted in multiple attempts to redevelop the PJ slum as a tourist destination. The PJ slum residents use a two-prong approach to defy those attempts: FYWA thwarts large-scale projects through their media outreach and legal filings when necessary; the PJ slum residents prevent piecemeal re-development of their community by refusing to sell their property to outsiders (non-fishing families) (Senior citizen from the focus group 5/22/2014). The social capital that the residents built through mutual investment in the community (temples) and cultural/religious activities (religious ceremonies) generates a sense of trust among the residents thereby reducing the probability of piecemeal development of the community by outsiders. Additionally, the strong dose of social capital within the community, places a high opportunity cost on the government to want to disturb the community.

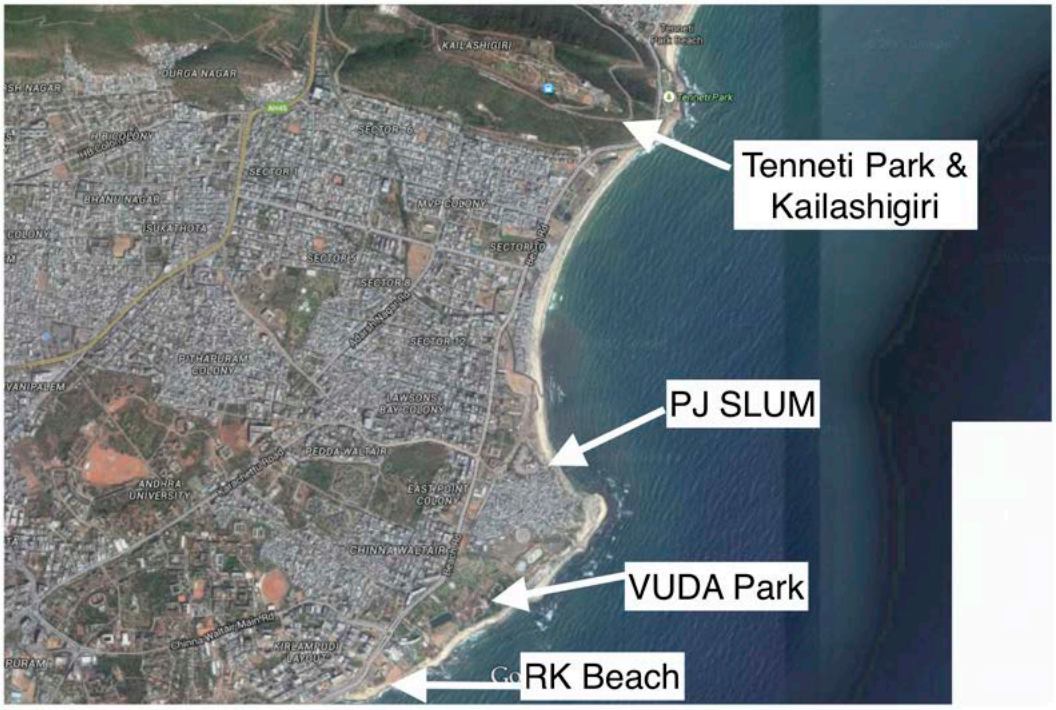

Figure 8: PJ slum and surrounding tourist destinations. Source: Google Earth

Unlike the 1983 fire that ravished the PJ slum within a few minutes, tourist-oriented development is a slow moving threat. Just like the fire ushered a new era of development, the tourist oriented development ushered in a new era of political thinking in the community. The older leaders in the PJ slum are illiterate and are not knowledgeable about laws and bureaucratic procedures. These leaders trust the elected representative or depend on the government bureaucrats to assist them with welfare schemes (Senior citizen focus group 5/22/2014). Whereas, the youth leaders at the FYWA use the media and do not hesitate to take legal action and fight with powerful opposition for their human rights, community rights or their fishermen rights. This drastic change in the community's interaction with the bureaucratic agencies over one generation speaks volumes about the role of education and empowerment.

Resilience in Urban Slums

As shown in this paper, two adaptive cycles have occurred in the PJ slum in the past forty years. Despite the multiple challenges PJ slum maintains its social, cultural and economic identity as a fishing village where 70% of the adults depend on fishing as their livelihood (Immanuell & Rao, 2012). PJ slum successfully avoided alternative undesirable states, including loss of local control, loss of fishing, and tourism oriented development.

The first cycle started when the community was notified as a slum in 1969 (*conservation, K). Creative destruction* (Ω) came in the form of the fire accident. The accident was a fast moving variable, but the community was able to recover (*reorganization, α)* from the loss primarily due to its ability to connect (or link) to the government agencies. This vertical linkage to the government agency provided the capital to recover from the fire accident and transform in to a new community. The PJ slum is a testament to the fact that the physical and human capital of slums can be improved while preserving the social and ecological assets of the community. Thirty years after the redevelopment, the community continues to be desirable and loved by a younger generation who are willing to invest time, energy and resources to preserve and protect it (*growth, r)*. Slums when redeveloped in collaboration with the community can be resilient in the long term.

In the second cycle, the threat was the intent to develop the seashore for tourism; this threat unlike the fire accident moves more slowly but is more dangerous than the fire (*creative destruction,* Ω). The community accessed capital in the form of knowledge and training from the NGO Action Aid to file legal petitions against the private developers and government agencies (*reorganization, α)*. Over the years, the FYWA developed a system to file legal petitions against these developments and became a politically savvy organization *(growth, r).* The high reserves of bonding and bridging within the community provide several non-monetary incentives to residents of the PJ slum; the residents therefore abide by the community's pact and do not sell their property to outsiders (non-fishermen) thereby avoiding piecemeal redevelopment and gentrification of the slum.
The adaptive cycle and complex systems theory in general are useful integrating frameworks. However, to explain causes and effects in specific cases disciplinary theories must be used. In the case of the PJ slum, the bonding, bridging and linkage capital provides a valuable disciplinary explanation. The capacity to self organize is the foundation of resilience. Rebuilding this capacity at times requires access to external resources; investment in capital (social, physical or knowledge) is the way to enable reorganization and rebuilding. The PJ case shows that, bonding and bridging social capital are central for building resilience in slums. However, this holds true only for the conservation and growth phases of the adaptive cycle. The PJ slum dwellers relied on their links with external agencies in order to build capital and recover from disasters.

Academic and policy debates on slums can be placed on a continuum; at one end of the spectrum slums are portrayed as signs of underdevelopment- a series of problems evident in their most extreme form in exploding mega cities – a planet of slums (Davis, 2006; UN-Habitat, 2003). At the other end of the spectrum, the slums are seen as an evidence of the creativity, ecological superiority, romanticized entrepreneurialism and adaptability (Appadurai, 2001; Boonyabancha, 2005).

The PJ slum case study shows that a slum, which was at one end of the spectrum (underdeveloped), can transform to the other end of the spectrum. Through this case study we illustrate that resilience on the ground is a long and laborious process, the PJ slum residents collaborated with the government and non-government organizations to improve the physical and social infrastructure of their slum. The residents invested time, money and labor to rebuild their community from ground up.

The PJ case is an exception in that it was able to access linkage capital at two different times in its history. Accessing linkage capital is not possible for all urban slums especially when slums are seen as a hindrance to urban development (Bhan, 2009). The urban poor's existing hardships are further exacerbated when governments and city municipalities reject the subalterns' claims on urban space (Datta, 2012). Informal small-scale businesses including traditional fishermen are being fought against and displaced, which leads to the marginalization of the informal economy and contributes to the restructuring of informal economy. Today, aesthetics and beautification have become key criteria of urban governance, and discursively marginalizing and physically displacing the traditional elements of the urban economy are seen as modernizing cities.

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