

**RESILIENCE ASSESSMENT BENCHMARKING AND IMPACT TOOLKIT (RABIT)** 

# Benchmarking Urban Community Resilience

## Piloting the Resilience Assessment Benchmarking and Impact Toolkit (RABIT) in Costa Rica

Angelica V. Ospina, Richard Heeks, Kemly Camacho, Mariana Calvo, Vivian Zúñiga, Priscilla Barrios, Katherine Marin and Isabel Rojas

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Centre for Development Informatics (CDI) Global Development Institute, SEED University of Manchester, UK

cdi@manchester.ac.uk. http://www.manchester.ac.uk/cdi **Cooperative Sulá Batsú** San José, Costa Rica

info@sulabatsu.com http://sulabatsu.com

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Additional information and materials relating to this report can be found at:

• Nexus for ICTs, Climate Change and Development (NICCD), http://www.niccd.org/

For enquiries please contact:

- Prof. Richard Heeks, University of Manchester, richard.heeks@manchester.ac.uk
- Dr. Kemly Camacho Jiménez, Cooperative Sulá Batsú, kemly@sulabatsu.com

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## **Executive Summary**

The objective of this case study is to present the main findings and suggested areas of action emerging from a six-month pilot implementation of the "Resilience Assessment Benchmarking and Impact Toolkit" (RABIT) in Barrio Luján, a vulnerable urban community of San José, Costa Rica. The pilot was implemented by the University of Manchester's <u>Centre for Development</u> <u>Informatics (CDI)</u> in collaboration with the <u>Cooperative Sulá Batsú</u>.

This document is addressed to practitioners, decision makers and researchers working on:

- information and communication technologies for development (ICT4D) and/or
- resilience (including climate change and disaster response) and/or
- community development.

It is for those interested in new approaches (a) to benchmarking community resilience, and (b) to assessing and strengthening the impact of development interventions – particularly use of ICTs – to build resilience, including resilience to climate change.

Two shorter summaries of this case – one on resilience; one on e-resilience – and a RABIT Implementation Handbook can be found at: <u>http://www.niccd.org/resilience</u>

#### **Key Points**

- A systemic understanding of resilience is both useful and necessary in designing, implementing and assessing development interventions. Resilience is defined as the ability of systems (such as a community) to withstand, recover from, adapt to, and potentially transform amid change and uncertainty. It consists of three foundational attributes (robustness, self-organisation, learning) and six enabling attributes (redundancy, rapidity, scale, diversity, flexibility, equality).
- The "Resilience Assessment Benchmarking and Impact Toolkit" adds value in three ways. First, by offering an in-depth understanding of a community's resilience. Second, by providing a robust means to measure both resilience baselines and the impact on resilience of interventions. Third, by identifying strategic priorities for action that will maximise the resilience impact of climate change initiatives or other development interventions at community, district and national levels.
- RABIT was used at the community level to measure and benchmark the relative strength and weakness of the nine different attributes of resilience (see Figure i). In this particular case, the perceived strengths of the community related mainly to *robustness* (e.g. linked to the presence and perceived capacity of multiple institutions in the community) and *selforganisation* (e.g. existence of community groups, and sense of belonging and trust from long-term residents). The perceived weaknesses were also with the community's *robustness* (e.g. lack of emergency preparedness, lack of waste management practices which exacerbates flooding, weak infrastructure, insecurity), and to a lesser extent with attributes of *self-organisation*, *scale* and *equality*, among others.
- These findings provide a valuable starting point for development interventions as they (a) identify current resilience strengths that can be built upon as part of new or ongoing initiatives, (b) provide a 'snapshot' of issues that are perceived as priority areas for action at the local level, and (c) give an indication of weaknesses that need to be strengthened as part of efforts to build community resilience.
- ICTs' potential to impact community resilience remains largely untapped (see Figure ii). The strongest ICT impact is on the community's *diversity* & *flexibility* (e.g. using ICTs to identify new courses of action and opportunities), *self-organisation* (e.g. use of mobile phone and Internet applications for social networking), and *rapidity* (e.g. use of ICTs to access support in an emergency). Lower levels of ICT usage were found in regards to attributes of *robustness*, *redundancy*, *equality*, *scale*, and *learning*.



Figure i. Relative salience of strength vs. weakness of resilience attributes, Barrio Luján



Figure ii. Contribution of ICTs to resilience attributes

• The evidence on current benchmark levels of ICT usage in relation to resilience attributes and markers can be turned around to identify the level of shortfall from the pinnacle of 100% usage. This gap can then create a 'traffic light' system of priorities for action: red for high priority, yellow for medium priority, green for low priority, as shown in Table i. (White indicates data was not available from the pilot survey.)

| Attribute               | Marker                                  |
|-------------------------|---|
| Robustness              | Physical Preparedness                   |
|                         | Institutional Capacity                  |
|                         | Multi-Level Governance                  |
| Learning                | Capacity Building                       |
|                         | New and Traditional Knowledge           |
|                         | Reflective Thinking                     |
| Scale                   | Multi-Level Networks                    |
|                         | Resource Access and Partnerships        |
|                         | Cross-Level Interactions                |
| Equality                | Competency Gap Reduction                |
|                         | Inclusiveness                           |
|                         | Openness and Accountability             |
| Redundancy              | Resource Spareness                      |
|                         | Functional Overlaps and Interdependency |
|                         | Resource Substitutability               |
| Rapidity                | Rapid Resource Access                   |
|                         | Rapid Resource Assessment/Coordination  |
|                         | Rapid Resource Mobilisation             |
| Self-Organisation       | Collaboration and Consensus             |
|                         | Social Networks                         |
|                         | Local Leadership and Trust              |
| Diversity & Flexibility | Different Actions/Opportunities         |
|                         | Adaptable Decision-Making               |
|                         | Innovation Backbone                     |

**Table i**. e-Resilience attribute and marker priorities for action

• A whole series of priority actions can then be identified relating to resilience generally and also to ICTs and resilience ("e-resilience") specifically. Full details are in the main case study but examples for the highest-priority attribute for action – robustness – include:

- **Resilience actions**: Community campaign to clear and maintain river area prone to flooding; Devolve seedcorn funding to community Risk and Disaster Prevention Group; Municipal authorities (government, fire, police) to hold participatory workshop for community youth on community development including emergency prevention and response.

- **e-Resilience actions**: Provide to the community well-visualised overviews of climate change impacts and priorities for adaptive actions; Provide training to Risk and Disaster Prevention Group on uses of ICT in risk identification and emergency response; Utilise ICTs to support community youth training and engagement workshops on community development.

This full case study report has four sections. Section 1 provides an overview of the context of study and the research methods used as part of the pilot. Section 2 presents findings on the community's vulnerability and benchmarks its resilience in the face of stressors such as climate change. Section 3 benchmarks the role of ICTs (mobile phone and Internet) vis-a-vis community resilience, assessing the contribution of these technologies to the nine resilience attributes. In sections 2 and 3, the analysis of findings includes data visualisation in various formats. The final section provides a series of recommendations for practitioners and decision-makers, to help strengthen community resilience through general and ICT-specific interventions, based on the experiences of Barrio Luján.

## **Understanding Resilience**

Resilience is an essential capacity of communities if they are to survive and thrive amid the environmental, economic and social shocks likely to arise during the 21st century. Defined as the ability of vulnerable systems to withstand, recover from, adapt to, and potentially transform amid change and uncertainty (Ospina and Heeks, 2010), resilience plays a crucial role in the achievement of development outcomes. It provides a holistic, long-term and community-centred approach that is rising up the development agenda.

Recognising the need for robust tools for baseline measurements of resilience, and for assessment of the impact on resilience of interventions such as ICT projects, the University of Manchester's Centre for Development Informatics (CDI) developed RABIT: the "Resilience Assessment Benchmarking and Impact Toolkit".

Drawing from a combination of systems thinking and fieldwork in the global South, RABIT was launched in September 2013 through a pilot project that sought to test the tool's contribution to benchmarking and impact assessment of development interventions on the resilience of low-income communities. The Cooperative Sulá Batsú was selected through an open call for partners to lead the implementation of the pilot in an urban community of Costa Rica.

RABIT was implemented in Barrio Luján, a low-income community located in San José, Costa Rica's capital city. The selection of the location was based on the convergence of several factors that were key for the pilot's implementation:

- (a) proven vulnerability to and awareness of climate change impacts, including recent experiences with flooding,
- (b) widespread use of ICT tools such as mobile phones and the Internet, and
- (c) interest in the notion of resilience, including the involvement of the municipal government in the Network of Resilient Cities, supported by the United Nations Office for Disaster Risk Reduction (UNISDR).

An additional factor considered in selection of the pilot site was presence of an active community Risk and Disaster Prevention Group, which has been working on the adoption of measures to respond and prepare for the impact of climate-related stressors and natural disasters in Barrio Luján, in collaboration with the municipality (local government and related local-level agencies such as police and fire).

The RABIT pilot set out to benchmark the community's resilience to climate change, and to benchmark ICTs' contribution to resilience, while identifying their potential to contribute further. The analysis was based on establishing linkages between ICT usage and a series of resilience attributes that form the conceptual foundation of the toolkit. As discussed next, those attributes are: robustness, self-organisation, learning, redundancy, rapidity, scale, diversity, flexibility and equality.

Further details on the conceptual foundation of RABIT are provided in the <u>Implementation</u> <u>Handbook</u>. As a reference to the analysis that follows in sections 2 and 3, the attributes of community resilience and their key "markers" are summarised in Table 1.

| Resilience<br>Attribute                     | Definition   | Key Markers/<br>Characteristics  |  |  |
|---|--|--|--|--|
| FOU   | FOUNDATIONAL ATTRIBUTES OF COMMUNITY RESILIENCE  |  |  |  |
| Robustness                                  | <ul> <li>Ability of the community to maintain its<br/>characteristics and performance in the face<br/>of environmental shocks and fluctuations.</li> </ul>   | <ul> <li>Physical Preparedness</li> <li>Institutional Capacity</li> <li>Multi-level Governance and<br/>Networking</li> </ul>                   |  |  |
| Self-<br>Organisation                       | <ul> <li>Ability of the community to independently<br/>re-arrange its functions and processes in<br/>the face of an external disturbance,<br/>without being forced by external<br/>influences.</li> </ul>  | <ul> <li>Collaboration/Consensus-<br/>building and Participation</li> <li>Social Networks</li> <li>Local Leadership and Trust</li> </ul>       |  |  |
| Learning                                    | <ul> <li>Capacity of the community to generate<br/>feedback with which to gain or create<br/>knowledge, and strengthen skills and<br/>capacities. Closely linked to the<br/>community's ability to experiment,<br/>discover and innovate.</li> </ul> | <ul> <li>Capacity Building</li> <li>New and Traditional<br/>Knowledge</li> <li>Reflective Thinking</li> </ul>                                  |  |  |
| ENABLING ATTRIBUTES OF COMMUNITY RESILIENCE |  |  |  |  |
| Redundancy                                  | <ul> <li>Extent to which community resources and<br/>institutions are substitutable; for example,<br/>in the event of disruption or degradation.</li> </ul>  | <ul> <li>Resource Spareness</li> <li>Functional Overlaps and<br/>Interdependency</li> <li>Resource Substitutability</li> </ul>                 |  |  |
| Rapidity                                    | <ul> <li>Speed at which assets can be accessed or<br/>mobilised by community stakeholders to<br/>achieve goals in an efficient manner.</li> </ul>  | <ul> <li>Rapid Resource Access</li> <li>Rapid Resource Assessment/<br/>Coordination</li> <li>Rapid Resource Mobilisation</li> </ul>            |  |  |
| Scale                                       | <ul> <li>Breadth of assets and structures a<br/>community can access in order to<br/>effectively overcome or bounce back from<br/>or adapt to the effects of disturbances.</li> </ul>  | <ul> <li>Multi-level Networks</li> <li>Resource Access and<br/>(intra/inter) Partnerships</li> <li>Cross-level Interactions</li> </ul>         |  |  |
| Diversity and<br>Flexibility                | <ul> <li>Ability of the community to undertake<br/>different courses of actions with the<br/>resources at its disposal, while enabling<br/>them to innovate and utilise the<br/>opportunities that may arise from change.</li> </ul>                 | <ul> <li>Different Courses of<br/>Action/Emerging<br/>Opportunities</li> <li>Adaptable Decision-making</li> <li>Innovation Backbone</li> </ul> |  |  |
| Equality                                    | • Extent to which the community provides equal access to rights, resources and opportunities to its members.   | <ul> <li>Strengthened Competencies/<br/>Gaps' Reduction</li> <li>Inclusiveness</li> <li>Openness and Accountability</li> </ul>                 |  |  |

Table 1: Attributes of resilient communities: Summary of definitions and key markers<sup>1</sup>

Building upon this conceptual approach, the next section provides a brief overview of the context of RABIT's implementation.

<sup>&</sup>lt;sup>1</sup> Ospina, A.V. (2013) *Climate Change Adaptation and Developing Country Livelihoods: The Role of Information and Communication Technologies*, PhD thesis, IDPM, University of Manchester, UK.

# Section 1. Context of Study and Methods

This section presents an overview of the context in which RABIT was implemented, and of the methods used for data collection. The first sub-section provides a general background of Barrio Luján, Costa Rica. The second describes the pilot's approach to data gathering through three key instruments: surveys, semi-structured interviews, and focus groups. These instruments were used with the objective of benchmarking the community's resilience, particularly to climate change impacts, and of benchmarking the role of ICTs in resilience.

## 1.1. Context of Study: Barrio Luján, Costa Rica

With a continental area of approximately 51,000 Km<sup>2</sup>, and sharing borders with Nicaragua, Panamá, the Caribbean and the Pacific oceans (Figure 1), Costa Rica is a Central American nation characterised by its topographic, climatic and biological diversity.



Figure 1. Map of Costa Rica. Source: Ezilon Maps, 2014<sup>i</sup>.

According to Costa Rican government data, approximately 61% of its 4.8 million inhabitants are located in urban areas<sup>ii</sup>. Access to potable water is estimated to be 99% in urban areas, and 92% in rural areas. The country is recognised for having one of the highest education levels of the region, a strong tourism industry, rich natural resources and biodiversity.

Despite successful economic expansion during the last 25 years, largely based on trade liberalisation and export-oriented strategies, World Bank data suggests that extreme poverty increased from 3.5% in 2008 to 6.4% in 2011, "as growth largely benefited skilled labor, and secondary education presented lags, especially among Costa Rica's poor"<sup>iii</sup>. During this same period problems of citizen security, drug trading, corruption and inequality rose<sup>iv</sup>.

The increasing manifestations of climate change in Costa Rica have being recognised in two National Communications to the United Nations Framework Convention on Climate Change (UNFCCC), prepared in 2000 and 2009<sup>v</sup>. Documented climate change impacts include sea level rise, increased frequency and magnitude of El Niño events, increase in the occurrence of extreme weather events, increasing average and night temperatures, and more frequent urban hydro-meteorological phenomena, among others<sup>vi</sup>.

Although the various zones of the country experience different impacts of extreme meteorological events (e.g. ENSO effects in the Caribbean and Pacific coasts), a study conducted with the support of the Ministry of Environment and Energy (MINAE) and the National Meteorological Institute of Costa Rica suggests that changes in seasonality are expected to be well marked, with a reduction of rains during the traditional rainy season

(November-February), and an increase in rains during the dry or 'Summer' period (June-August)<sup>vii</sup>.

Research by the National University of Costa Rica<sup>viii</sup> suggests that the climatic variability recorded during the last decade will continue, decreasing rainy events and increasing drought periods, affecting the agricultural sector and the ecological equilibrium in zones that are characterised by constant humidity.

These manifestations have exacerbated the vulnerability of water resources, biodiversity and public health, to name a few of the areas explored in the second national communication. As indicated in a report produced by the Intergovernmental Panel on Climate Change (IPCC)<sup>ix</sup>, the temperature increase and the reduction in precipitation in Costa Rica have affected the country's water and electricity supply, and have been linked to an increase in the number of dengue cases reported in areas that were not affected in the past.

The central part of the country, where the capital San José is located, is affected by urban flooding events linked with strong precipitation and storm surges. The propensity to flooding caused by climatic events is exacerbated by the lack of urban planning and solid waste management<sup>x</sup>.

#### Barrio Luján

Within the context of San José, RABIT's implementation focused on Barrio Luján, a community located in the South-Eastern part of the city (see Figure 2). The neighbourhood is part of San José's 'Cathedral' district (2,31 Km<sup>2</sup>), and has approximately 1,868 inhabitants<sup>xi</sup>. The first references to this community date back to 1892, suggesting a long tradition in the city's history.



Figure 2. Administrative limits of Barrio Luján. Source: Madrigal J. (2008)<sup>xii</sup>

In the 2011 census, the total population of Barrio Luján was estimated to be 888 men and 980 women. 58% of its inhabitants were born and raised in the neighbourhood. 23% have migrated from other parts of Costa Rica, and 19% from other countries<sup>xiii</sup>. Census data also

indicates that most members of the community who reported an economic activity are employed by the private sector, followed by those that are self-employed and those that work for the public sector.

In terms of local housing infrastructure, the neighbourhood is composed by a majority of independent (housing) structures (500 cases reported in the census), followed by apartment buildings (151 cases), and 'cuarterias'<sup>2</sup> (34 cases). The overall condition of the housing infrastructure in the community is generally good, as reflected in the data summarised in Table 2:

| Physical condition of<br>housing infrastructure | Cases |
|---|-------|
| Good  | 382   |
| Regular   | 206   |
| Bad   | 43    |
| Total   | 631   |
| No response                                     | 56    |

**Table 2.** Condition of housing infrastructure in Barrio Luján. Source: INEC (2011).

#### ICT Usage

According to data from the International Telecommunication Union (ITU) (2014)<sup>xiv</sup>, there has been considerable growth in mobile usage in Costa Rica. The number of mobile-cellular telephone subscriptions increased from less than 800,000 in 2003, to over seven million in 2013. This is equivalent to a rise from 19 mobile subscriptions per 100 inhabitants in 2003, to 146 in 2013. In parallel to the growing diffusion of mobile phones, there has been a decline in the number of fixed-telephone subscriptions per 100 inhabitants, which dropped from 28 in 2003 to 20 in 2013.

There is a high level of mobile coverage (3G) offered by the main telecommunication providers (Kolbi, Claro and Movistar) in Barrio Luján, as summarised below:

| KOLBI COVERAGE- Barrio Luján    |        |  |
|---------------------------------|--------|--|
| Inside buildings                | 96.16% |  |
| Inside vehicles                 | 3.28%  |  |
| External                        | 0.53%  |  |
| Out of coverage                 | 0.03%  |  |
| CLARO COVERAGE- Barrio Luján    |        |  |
| Inside buildings                | 71.58% |  |
| Inside vehicles                 | 21.83% |  |
| External                        | 6.02%  |  |
| Out of coverage                 | 0.57%  |  |
| MOVISTAR COVERAGE- Barrio Luján |        |  |
| Inside buildings                | 76.09% |  |
| Inside vehicles                 | 17.93% |  |
| External                        | 5.58%  |  |
| Out of coverage                 | 0.40%  |  |

**Table 3.** Summary of mobile telephony coverage in Barrio LujánSource: Telecommunications Superintendence of Costa Rica (2014) <a href="http://mapas.sutel.go.cr/">http://mapas.sutel.go.cr/</a>

In terms of the Internet, ITU data suggests that the percentage of individuals using Internet in the country increased from 20% in 2003 to 46% in  $2013^{xv}$ .

<sup>&</sup>lt;sup>2</sup> The Spanish term 'cuartería' refers to physical areas that are densely populated, with temporary/fragile infrastructure, low sanitary conditions and poor access to public services, and therefore are inhabited by vulnerable populations.



Images of Barrio Luján

With respect to Barrio Luján, some of the key stakeholders operating at the intersection of climate change and ICTs at the micro, meso and macro level include the following:



## **1.2. Research Methods**



Sulá Batsú researchers studying a map of Barrio Luján

This sub-section presents an overview of the data gathering tools that were used as part of the RABIT pilot in Costa Rica. Each of the tools was adjusted in collaboration with the project partners to respond to the characteristics to the local context, and implemented by a team of Sulá Batsú researchers.

Further details about the research methods recommended for the implementation of RABIT (i.e. versions of the tools in their original format, to be adjusted to the context of implementation) can be found in the <u>RABIT Implementation Handbook</u>.

## a. Survey

A total of fifty survey interviews were undertaken in Barrio Luján. Table 4 summarises the basic information of the survey's respondents. A sample of the survey questionnaire is available in Annex 1.

- The predominance of two age groups among respondents (senior and youth) can be partly explained by the fact that the surveys were conducted during the day, at times in which mostly students, pensioners, house workers, and self-employed respondents were at home.
- Previous to the stage of the survey's implementation (pre-pilot stage) the questionnaire was designed and adjusted through numerous drafts and revisions. The adjustment of the tool took into consideration the following aspects:
  - (a) the formulation of the questions and the language used needed to be clear and appropriate for the intended respondents (i.e. community members),
  - (b) the key areas of interest to the research (i.e. questions about ICT usage and resilience attributes/markers) needed to be integrated into the survey,
  - (c) the length of the survey had to be reasonable in order to limit its implementation to (approximately) 15 minutes,
  - (d) the survey's format/layout needed to be clear and easy to use by the local surveyors (and therefore, their participation and input in the process of adjustment of the tool was key).
- The pilot stage was crucial to identify problems and adjust the instrument. Issues that were corrected based on the pilot included repetitive questions, confusing language, confusing response options, length of the questionnaire, and order of the questions.

| Number of<br>Respondents                   | <ul> <li>50 survey questionnaires completed</li> </ul>   |
|--|--|
| Survey Location                            | Barrio Luján, San José, Costa Rica   |
| Characteristics of<br>Survey Respondents   | <ul> <li>Age groups:<br/>46 years old or older: 44%<br/>26 to 45 years old: 20%<br/>16 to 25 years old: 36%</li> </ul>   |
|  | • Occupation: students (26%), employees (24%), pensioners (20%), house workers (16%) and self-employed (12%). 2% reported being unemployed at the time of the survey.  |
|  | • <b>Gender:</b> 60% of the survey respondents were females and 40% were males.  |
| Stages of<br>Implementation                | <ul> <li>The survey's implementation involved three main stages:</li> </ul>  |
|  | <ul> <li>(a) Pilot stage, through which the instrument was tested among a limited number of respondents (nine) in the community.</li> <li>(b) Adjustment stage, through which the tool was adjusted based on the feedback received from participants and surveyors.</li> <li>(c) Roll-out stage, through which the revised questionnaire was implemented.</li> </ul> |
| Survey Duration                            | • Considering the target population (members of<br>an urban community), as well as the time and<br>resources available for the activity (e.g.<br>surveys conducted during the day/working<br>hours, offering no economic contribution for<br>the participant's time), the questionnaire was<br>designed to last between 10 to 15 minutes.                            |
| Systematization and<br>Analysis of Results | <ul> <li>Survey results were systematised an analysed<br/>using SPSS software and Excel.</li> </ul>  |

**Table 4.** RABIT data gathering tools: Survey

## b. Semi-Structured Interviews

A total of 10 interviews were conducted in Barrio Luján, with the participation of 20 interviewees, as summarised in Table 5. The sampling approach was purposive, targeting key local stakeholders (e.g. community leaders, community organisations), and institutions (e.g. fire department, police department) operating at the micro and meso levels. A sample of the interview protocol is available in Annex 2.

| Number of                  | • 10 semi-structured interviews, comprising:  |
|----------------------------|---|
| Interviews                 | <ul> <li>- 6 individual interviews</li> <li>- 4 group interviews</li> </ul>   |
|                            | - A total of 20 interviewees  |
| Interviews<br>Location     | Barrio Luján, San José, Costa Rica  |
| Interview<br>Respondents   | • <b>Micro level:</b> individuals (members of the local community): 6 interviews  |
|                            | • <b>Meso level:</b> representatives of groups or<br>organisations working at the local level, including<br>the police, the fire department, the local<br>emergency committee, the community association<br>and the 'Entrepreneurial Women's Group' of Barrio<br>Luján': 4 interviews |
|                            | • <b>Gender:</b> 65% of the interview respondents were females and 35% were males.  |
| Key Interview<br>Themes    | <ul> <li>Semi-structured interviews sought to address<br/>four main issues:</li> </ul>  |
|                            | a) Understand the local context: strengths and  |
|                            | b) Identify the climate change impacts and local  |
|                            | response to climatic stressors.<br>c) Identify the role of ICTs and the challenges to   |
|                            | their use.<br>d) Assess the presence of resilience attributes.  |
|                            | based on the resilience markers (identified in RABIT's conceptual framework).   |
| Interview<br>Duration      | <ul> <li>The average duration of each interview was 35 to<br/>40 minutes.</li> </ul>  |
| Results<br>systematization | <ul> <li>9 of the 10 interviews were recorded and<br/>transcribed (one interviewee did not wish to be<br/>recorded)</li> </ul>  |
|                            | <ul> <li>Notes taken by the interviewers were also used to complement the data gathered.</li> </ul>   |

Table 5. RABIT data gathering tools: Semi-structured interviews

## c. Focus Groups

Two focus groups were implemented as part of the RABIT pilot: one with the partner organisation in Costa Rica (FG1), and one with community members (FG2), as summarised in Table 6.

| Number of Focus<br>Groups (FG)              | 2 focus groups  |
|---|---|
| Focus Group<br>Participants and<br>Location | <ul> <li>FG 1: Sulá Batsú staff, offices of Sulá Batsú,<br/>San José.</li> <li>FG 2: Barrio Luján community members,<br/>communal room, Barrio Luján, San José.</li> </ul>    |
| Number of<br>Participants                   | <ul> <li>FG 1: 10 participants</li> <li>FG 2: 21 participants</li> </ul>  |
| Methodology                                 | <ul> <li>Both focus groups were implemented using the<br/>Ketso<sup>xvi</sup> methodology to ensure creative and<br/>participatory engagement.</li> </ul>                     |
| Focus Group<br>Duration                     | <ul> <li>FG 1: 2 hours</li> <li>FG 2: 2 hours</li> </ul>  |
| Systematization of<br>Results               | <ul> <li>Ketso results were systematised using a<br/>Microsoft Excel spreadsheet designed for<br/>writing up the results of <b>Ketso</b> workshops<sup>xvii</sup>.</li> </ul> |
|   | <ul> <li>Data was complemented by notes taken by the<br/>research team during the sessions.</li> </ul>  |

Table 6. RABIT data gathering tools: Focus groups

Further details about the methodology used in the focus group with the community are presented below.

#### **Focus Group: Community Members**

#### Objectives

The focus group with community members was the first data collection activity implemented in Barrio Luján. It was crucial to built local trust and collaboration, adjust the pilot to respond to local needs, and set the basis for subsequent stages of data collection.

The session had three main objectives:

- (a) Introduce RABIT to community members and validate its potential contribution/local relevance.
- (b) Foster the community's engagement in the project, particularly local support for data gathering activities (i.e. survey and interviews)
- (c) Identify key issues/priorities for the community in regards to ICT usage, including their role and potential as part of climate change responses.

Ketso Table #1

Ketso Table # 2





#### Structure

The discussion was structured around seven key areas of vulnerability (referred to as 'vulnerability dimensions' in section 2.1). It sought to identify the key strengths and weaknesses of the community as perceived by the focus group's participants, as well as the potential of ICT tools.

Considering the target audience, the language used to describe each of the vulnerability dimensions was simplified (i.e. avoiding terms such as 'livelihoods and finance', 'food security' and 'habitat'), as follows:

- (a) Social aspects
- (b) Economic resources
- (c) Water

- (d) Nutrition
- (e) Migration
- (f) Health
- (g) Information and communication

Focus group questions included the strengths and weaknesses of the community, the main challenges posed by climate change impacts at the local level, the role/potential and the challenges posed by ICT in Barrio Luján, as well as ways to overcome those challenges.

#### Ketso Table #1



#### Ketso Table # 2



Overall, the Ketso focus group was a valuable method to present the project to the community, provide a participatory space for local stakeholders to identify and discuss areas of vulnerability, and reflect about the potential role of ICTs towards resilience. The results of the focus group discussions have been integrated in the following sub-sections,

in order to facilitate the flow of the analysis and contribute to the validation of findings. Details about the methodology used (Ketso Guidelines for Facilitators) are available in Annex 3. Findings of the focus group conducted with Sulá Batsú staff, are available in Annex 4.

# Section 2. RABIT Findings: Community Resilience

This section presents an assessment of Barrio Luján's resilience, based on analysis of the data gathered through semi-structured interviews with community stakeholders. In order to strengthen the validity of the findings, focus group data has been integrated, when available, to relevant sections of the analysis.

The section is structured into three parts. The first provides an overview of the vulnerability dimensions and climate change manifestations in Barrio Luján, based on perceptions of local stakeholders. The second explores the community's resilience, linking perceived areas of strength and weakness of the community with the set of resilience attributes that constitute RABIT's conceptual framework (Table 1). The third sub-section presents an overview visualisation of resilience findings in Barrio Luján.

## 2.1. Vulnerability and Climate Change Impacts in Barrio Luján

This sub-section presents an overview of perceived vulnerability dimensions and climate change manifestations at the local level.

In regards to areas of vulnerability (i.e. socio-economic conditions, habitat and migration, health, livelihoods and finance, water and food security) interview findings suggest that community members prioritise problems related to local socio-economic conditions, particularly insecurity and drug consumption, followed by habitat problems due to inadequate waste disposal (that exacerbate the disruptive impact of floods) and weak infrastructure.

Several of the vulnerability dimensions mentioned by respondents exacerbate the impacts of external stressors such as climate change (e.g. garbage disposal, location of the former "Dos Pinos" factory, weak infrastructure).

In terms of climate change manifestations, interviewees perceive both short- and long-term impacts in Barrio Luján, as reflected in Figure 3<sup>3</sup>. Short-term impacts are the most prominent manifestations identified, particularly episodes of flooding (identified by most of the interviewees), strong winds and precipitation. Long-term or chronic climate change impacts included temperature variations and changes in seasonality.

Findings evidence the existence of mutually-reinforcing linkages between climate change impacts and vulnerability dimensions (i.e. climate change impacts exacerbate and are exacerbated by pre-existing vulnerability dimensions). These linkages are represented in Figure 3 with two-way arrows.

<sup>&</sup>lt;sup>3</sup> Figure 3 summarises the findings related to perceived climate change manifestations and perceived vulnerability dimensions in Barrio Luján, based on the analysis of interview transcripts. It classifies the data according to short- and long-term climate change impacts and vulnerability dimensions, ranking the issues in order of importance based on the number of interviews in which the issue was mentioned ('I#'=Interview number).





In terms of **perceived climate change manifestations**, 35% of the issues identified in the **focus group** with community members relate to the increased occurrence of floods, followed by emergency situations (23%), and strong precipitation (18%) (Figure 4). This confirms the emphasis placed on short-term/emergency situations by the community.



In regards to the perceived **impacts of climate change** in the community, focus group participants identified as the predominant issue the exacerbation of pre-existing problems related to inadequate garbage disposal (Figure 5). This is linked to the contamination of the

river basin and the obstruction of the river's flow, with the subsequent exacerbation of flooding events.



Other vulnerabilities exacerbated by climate change impacts include health and infrastructural issues (i.e. property damages and sewerage blockages).

Related to **perceived vulnerabilities of Barrio Luján** (see Figure 6), the key issues that emerged during the focus group discussion were the (a) problems with waste disposal in the community, (b) lack of education/awareness about environmental issues and waste management, (c) need to improve communication and information sharing, and (d) impact of floods and strong precipitation at the local level<sup>4</sup>.



Other issues identified by focus group participants in regards to local vulnerability include the positive role of neighbours, local organisation and the adoption of preventive measures, as well as the importance of cooperation in response to emergency situations.

<sup>&</sup>lt;sup>4</sup> These issues were identified by adding the number of times that they were recorded (written down) by participants during the Ketso session.



Problems of waste disposal and contamination of the river basin in Barrio Luján.

The analysis of interview findings suggests the following key issues:

- There are **multiple stressors** that impinge upon the community and that exacerbate local vulnerability. One of the main stressors perceived by respondents is insecurity, generated by people identified as 'outsiders' to the community that come to the neighbourhood to commit crimes.
- There is a **low level of awareness** about **long-term impacts of climate change**. Not surprisingly, community members are mostly concerned about the potential impact of acute shocks/natural disasters. The perception of risk and the level of awareness associated with long-term and indirect effects of climate change manifestations (e.g. incidence of increased temperature on dengue, cardiac diseases and the health condition of elders, the impact of flooding on the sewage system, the effect of more frequent storm surges on local infrastructure) remain low.
- Climate change impacts exacerbate pre-existing environmental vulnerabilities, particularly problems of waste disposal and contamination of the river basin in the community. Interview findings show linkages between the occurrence of more frequent and stronger precipitation episodes, the lack of environmental awareness/waste disposal, and the flooding of the local river.

As explained by an interviewee:

"We have a river, the river 'Ocloro'. It is what produces risk when there are strong precipitations upstream, in the mountains...But we also play a role, because we throw a

lot of waste into the river...and those materials will interrupt its course, as it runs through the community. That is an issue that needs to be dealt with". (I:3, p.24).

**Focus group** findings confirm that climate change manifestations both exacerbate and are exacerbated by pre-existing environmental vulnerabilities. They also indicate that there is a local awareness about short-term events such as floods (see Figure 4).

• In regards to adaptation to climate change impacts, the **emphasis is placed on short**term emergency response instead of long-term prevention for both acute and chronic impacts.

When asked about measures to prevent the impact of flooding in the community, an interviewee stated:

"Hmm...information to 'prevent'...no. What the emergency committee provides is support, post-event support, if it [an emergency] happens". (I:6, p.51).

• Findings suggest the importance of gaining a better understanding of local perceptions of climate change impacts in complex **urban environments**, recognising that climatic manifestations have different implications for different groups (e.g. seniors, service providers, institutions), and that the notions of change and risk may be perceived differently between and within communities.

As explained by an interviewee:

"Personally, I have felt a strong increase in terms of temperature, the heat, and maybe at night I have also felt stronger winds...But perhaps...[the style of] our daily lives means that we don't perceive the change so strongly... I haven't felt it so drastically, even though I know that it is there" (I:7, p.61)

The overall perceptions of interviewees in regards to climate change manifestations and vulnerability in Barrio Luján were confirmed by the results of the community's focus group. Focus group findings indicate that 'social aspects' (i.e. vulnerability dimensions related to 'socio-political conditions') are where most of the community challenges are perceived. Participants also identified challenges related to health issues and infrastructural weakness in the community.

Having identified the overall vulnerability context within which the analysis takes place, the following sub-section presents findings related to the resilience attributes of Barrio Luján.

## 2.2. Resilience Attributes: Community Strengths and Weaknesses

The analysis presented in this sub-section assesses Barrio Luján's resilience by linking the perceived strengths and weaknesses of the community with the nine attributes of resilient systems identified in Table 1. The analysis is based on interview and focus group data, and discusses most of the markers/characteristics of resilience (as per the conceptual approach presented in Table 1).

## 2.2.1. Community Strengths and Resilience Attributes

The following are the main attributes that contribute to the resilience of Barrio Luján, identified through analysis of interview findings.

#### Robustness

Interview respondents identified as the main strength of the community the presence of diverse **institutions** that can help respond to the impact of climatic and non-climatic stressors. Institutions identified include the fire department, the police, schools, universities, hospitals, as well as the existence of groups such as the local Risk and Disaster Prevention Group of Barrio Luján.

The institutional presence in the community is also linked, in some cases, with the perceived availability of institutional capacity to deal with emergency situations. When asked about plans to help reduce local risks (e.g. to flooding), a respondent stated:

"I believe that can be managed by the Fire Department of Barrio Luján (...) Because if the river level rises, the fire men are the ones who always come, because we have them [located inside] the community. They are very capable...they organise activities, they celebrate the day of independence of Costa Rica, and have activities with the school...they are very identified and committed with the community...so it's possible that they manage part of the assistance in an emergency situation" (I:3, p.27).

When asked about institutions that can support the community in emergencies, another added:

"The Fire Department...We haven't had to [request help], but we know that we can count on them" (I: 4, p.39).



Fire Department, Barrio Luján

The location of the community was also identified as a local strength, given Barrio Luján's proximity to the centre of San José, the easy access to broader services and amenities, and the constant flux of people that helps to sustain the local economy. As explained by one interviewee,

"We have a school, and the Universities have also come here...the 'Veritas' and the one of 'Sciences and Arts', so there is movement and flow of people, which helps to a certain extent to maintain the economy (...) And because of the geographic location, people have access to jobs...so there is not so much unemployment...And we have access to schools...the 'Liceo' and the 'School Republic of Chile'...so children have easy access to education" (I:3, p.23).

#### Another added:

"Our strengths are that we have two Universities, we have a clinic that is near-by....We travel short distances because we are close to downtown San José...We also have local butchers, vegetable stores...And the majority of people are house owners (...) We know each other by our names, sometimes entire families..." (I:2, p.11).



Traditional vegetable store and local 'soda', Barrio Luján

In addition to a robust institutional fabric, this statement suggests the perception of 'stability' in the community, in terms of existing networks of social capital, long-term inhabitants and relationships of trust, which can contribute to the community's robustness amidst change and disturbances.

In regards to the community's **physical preparedness**, some interviewees mentioned the availability of a communal room (where the local Development Association of Barrio Luján operates) that could be used as an emergency coordination centre for the community in situations such as earthquakes/natural disasters.

One interviewee mentioned examples of adaptive measures (e.g. infrastructure adjustments such as deeper water channels, cement barriers to protect the household) in response to the flooding of the local river. This confirms that climate change impacts can both exacerbate and be exacerbated by pre-existing stressors (e.g. lack of environmental management), as identified in section 2.1.1.

"[Regarding physical preventive measures adopted locally] I would say channelling. People put tables on their front doors to prevent the water from coming in. Sometimes, not always, they clean parts of the river basin –because in all the area close to "Dos Pinos" people used to dispose of all kinds of things: furniture, washing machines, refrigerators...So they have had to clean that in order to prevent, because the garbage blocks [the river] and it floods faster". (I:9,p.78).



Examples of infrastructural measures to mitigate the impact of flooding, Barrio Luján

Also linked to physical robustness, when the pilot took place members of the local Risk and Disaster Prevention Group were conducting a census to identify areas of infrastructural vulnerability in the community.

Illustrating how existing **networks** can contribute to the community's capacity to respond to stressors and continue operating amidst change, respondents mentioned a sense of "unity" among neighbours in emergency situations. As explained by one interviewee:

"This is a community of few [economic] resources, but there is a lot of 'humanity'. And that...makes the community to unite. In an eventuality, I see that neighbours provide support to each other, and are aware of each other" (I:8, p.75).

Illustrating the role of existing institutions in the sense of community 'unity' and networking, another added:

"We have a bank, a fire station, and a church (...). The church is deeply rooted in Barrio Luján because its membership is huge, particularly Catholic. So that unites [people]". (I:3, p.22).

Other issues mentioned include the availability of government support (e.g. school scholarships, funds for local development), which is linked to the perceived presence of institutions and governance at the local level.

#### Self-organisation

Evidence suggests the existence of efforts of **collaboration and consensus building** in the community, including the value attributed by Barrio Luján inhabitants to the Risk and Disaster Prevention Group, particularly to its ability to mobilise community members, and coordinate actions. Other examples identified by respondents include local associations (e.g. School Association, Development Association) and the Entrepreneurial Women's Group.



Photo 1. Plate commemorating the first 'Junta' (neighbourhood association) of Barrio Luján, 1951

Photo 2. Members of the community gathered at the communal room, Barrio Luján

Examples of self-organised activities related to climatic stressors include efforts by the women's group to contact the new owner of the former Dos Pinos factory to discuss the implications of the building's location on flooding risk levels (e.g. blockage of the river channel during strong precipitation events, exacerbating episodes of flooding).

Related to both self-organisation and equality, interviewees identified the existence of a cultural group that involves youth training, as well as a group that meets regularly with the local police to discuss security issues (as part of a programme called 'organised neighbourhood', that involves a network to disseminate alerts about suspicious activities in the area, and fund-raising activities to purchase security cameras, among others). The "Lions Club", an NGO that provides support to community activities, was also mentioned by respondents.

Evidence suggests that a relevant factor in the success of local self-organisation initiatives and to foster community participation is to avoid affiliation with political agendas. Findings in this regard could be linked to the fact that the pilot took place during the Presidential election campaign in Costa Rica, and therefore, there was a higher level of awareness of (and saturation with) political activism. As a member of the local emergency committee stated:

"I have seen that the meetings that I have organised have turned out fine, because participation has been good...But it has been because [participants] have seen that the meetings do not have anything to do with politics, because they run away from politics..." (I:2,p.16)

Also indicative of the community's self-organisation capacity, interviewees identified Barrio Luján as a community with long-term residents and families with a long tradition in the area, who have known each other from a long time. As explained by a respondent:

"This is a community in which people have lived for many years...they are all the same neighbours (...) I have seen ladies that have been living here for 30, 35 or 40 years, that's people that have grown up in the community (...) If there are no grandparents anymore, the parents or their children continue to live in the same house, so people know each other ever since" (I:1, p.3, p.5).

#### Another added:

"The population of Barrio Luján is very stable. The ones that came here 80 or 90 years ago continue having their family members here, they own their own land...It is like a small town" (I:3, p.22)

The longevity of its residents contributes to the existence of **trust and sense of belonging** to Barrio Luján, which helps to strengthen social networks (as described under Robustness) and local leadership, and facilitates the community's self-organisation. It can also contribute to other attributes of resilience (e.g. Robustness via social networking, and Learning via social memory and knowledge sharing).

#### Learning

In regards to learning, interviewees identified local **capacity building/training** opportunities, including first aid training (provided by the Red Cross) and handcrafts. Other training opportunities mentioned were associated with the capacity of local institutions (e.g. training received by the members of the local Risk and Disaster Prevention Group, by the municipality, and training received by members of the fire department to respond to emergency situations).

Although interviewees identified the lack of environmental awareness and waste management in the community as a weakness, they also mentioned an emerging awareness about the need to recycle, linked to efforts by the local schools and the "Boy Scouts" group.

Findings also suggest that senior members of the community can be an important source of social memory and **traditional knowledge** that can help inform adaptation strategies at the local level. For example, a senior interviewee recalls the experience of population relocation after an episode of flooding, as follows:

"There was flooding, and help was offered...That was 25 years ago, it was the last time that I heard about relocation of people...people were displaced. A terrain was bought in "Santa Fe", and people were displaced. But the people went back again to occupy the land adjacent to the river". (I:3, p.24).

When asked about experience sharing at the local level, a member of the Entrepreneurial Women's group added:

"Well yes, you start talking and the neighbours tell you things...In fact, we have a lot of support from seniors, people that have lived here for many years and that support us with this project...Like Doña Maria, from the vegetable store, who gives us advice and guidance..." (I:6 p.56)

#### Redundancy

Community members identified the availability of **different** (and potentially substitutable) **sources** of support in case of emergency situations, including family, friends, neighbours, and government institutions (e.g. IMAS (Joint Social Welfare Institute that provides assistance for those in need), municipality). Respondents also identified the development association and the "Lions' Club" as sources of support.

In relation to redundancy (i.e. **functional overlaps and interdependency**), findings suggest the availability of multiple institutions and services accessible at the local level (as reported before, under Robustness).

In terms of potential sources of **spare resources**, respondents mentioned capacity-building opportunities offered to local women to learn handcraft making as a source of income.

#### Rapidity

In terms of rapidity, interviewees mentioned the **swift response** of certain groups and institutions (e.g. the Risk and Disaster Prevention Group, the Emergency Committee of the municipality) to emergency situations that have affected the community, particularly incidents of flooding.

Referring to the local response during the most recent flooding, a community member stated:

"Yes, there was help from the community...And because the Fire Department is nearby, they act very fast" (I:8, p.78).

These actions have enabled **rapid coordination** and **resource mobilisation**, as explained by a member of the Risk and Disaster Prevention Group of Barrio Luján:

"[During the last flood] I asked another member of the group to focus on her sector, and then inform me about the needs, that way we could cover more ground...So she asked the people [affected] and wrote down their names, and then we analysed it and sent it to the municipality, on behalf of the committee..." (I:2, p.19)

A community member added:

"[During the last episode of flooding] We had a good response. An excellent response, from the IMAS and from the municipality itself. I called them afterwards and left a message, thanking them..." (I:4, p.39).

Some interviews acknowledged the role of early warning systems, but no details were provided about the type of information accessed or its usage.

#### Scale

Interview findings suggest that the creation of the local Risk and Disaster Prevention Group has had positive implications in the interactions/collaboration between scales and on the rapidity of response to climatic events.

Suggesting the existence of **multi-level networks** and **cross-level interactions** in emergency situations, such as those caused by climate change impacts, an interviewee explained:

"In cases of flooding of the river, us, as the Risk and Disaster Prevention Group in Barrio Luján, we have to prepare for the municipality the list of the people that have been affected and that require support. We then call them or send them a letter, to let them know who is in trouble. In the last flood we had the experience that the municipality reacted very quickly, and sent a message to IMAS informing them who had been affected, and IMAS also reacted quickly to that call for help" (I:2, p.12).

In regards to the local response in a situation of flooding, an interviewee added:

" I called 911 and they called the Fire Department...Then I insisted by calling the National Emergency Commission...and they called the municipality of San José (...) The next day people from Hydrology and from the Commission came [to assess the damage], and they contacted us with the IMAS" (I:4, p.34).

Participation in broader emergency preparedness training has fostered exchanges (i.e. **intralevel partnerships**) among risk and disaster prevention groups operating in different communities of San José, as illustrated below: "We have here a 'Family Emergency Plan' that a colleague gave us. This was the plan for emergency prevention that was used in 'Limón', where she lives. She participated in the training workshop that we attended...So we took [the Plan], and now we are going to use it in the visits that we are going to make in the community" (I:2,p.15).

#### **Diversity and Flexibility**

Evidence regarding diversity and flexibility in the community was scarce. Respondents mentioned that, over time, the community of Barrio Luján has adapted to change (such as changing economic conditions, demographic change), suggesting linkages with the adoption of different courses of action and adaptable decision-making.

#### Equality

In regards to equality, respondents identified the role of some local groups (e.g. Lions Club, local church, Janos cultural group, Entrepreneurial Women's group) organising activities targeted at seniors, youth and vulnerable members of the community, thus helping to strengthen their **competencies** (e.g. training of vulnerable women on handcrafts) and **fostering inclusiveness**. Illustrating this, an interviewee stated:

"There have been plenty of activities organised for seniors...we have supported talks and meetings...targeted at seniors..." (I:5, p.46).



Senior members of Barrio Luján

In regards to **openness**, respondents identified the selection of the members of the community association, which is done through a voting process.

## 2.2.2. Community Weaknesses and Resilience Attributes

The following are the main attributes that undermine Barrio Luján's resilience:

#### Robustness

All the interview respondents identified shortcomings in emergency preparedness of the community, including the **lack of physical infrastructure** to reduce local risk to climatic threats and natural disasters. Interviewees were unable to identify with certainty a physical location where they could go to seek refuge or assistance in case of a natural disaster or an emergency in the community. Most of the respondents 'guessed' that they could go to the church, the neighbourhood square, the communal room or the school, but there was no agreement on the location, and the capacity and condition of the different options was debated.

Illustrating the existence of **infrastructural weaknesses** in the community, a member of the Risk and Disaster Prevention Group stated:

"Sometimes I organise meetings here [in her own commercial establishment]...(...) Because currently, the communal room is having problems with its infrastructure, it needs support. We are going to do everything we can for the Emergency Commission to come and check it...because if there is an earthquake, it isn't in very good condition..." (I: 2, p.17).

In regards to weakened robustness (including lack of measures to protect the local infrastructure from shocks and disturbances), a member of a local institution explained:

"That is very hard (...). There is a little bit of it [protective measures] in the parking area of the Dos Pinos factory. Because a part of it [river bank] used to belong to Dos Pinos, they are the ones who used to control the [river] flow and maintain it clean...But that was done on an individual basis, because they were affected...But [preparedness at the level of] the municipality, or of the community, no". (I:7, p.66).

The lack of emergency preparedness was linked by interviewees to the lack of a 'culture of prevention' at the local level, as illustrated in the following statements:

"Because nothing has ever happened, the people do not prepare. And when something does happen is too late, then you have to figure out how to survive. The only ones that practice are the firemen. Otherwise....We have never seen an [emergency response] simulacrum here in the community" (I:1p.6)

"Costa Ricans are like...how could I say?...If there is an earthquake or if they are saying that there will be one, we say 'ahhh, ok, because it hasn't happened yet, maybe ultimately I will prepare' [laughs]. We leave everything for the last minute, we do not prevent. We are way too calm about it..." (I:2,p.14).

In regards to the lack of preparedness to respond to climate change emergencies or disasters, and linked to lack of climate change-related learning and awareness, an interviewee added:

"[We are not prepared] Because we haven't had to. Because we haven't lived through that. We are lacking...that 'group unity', as a community, to face climate change. Because we have the minimum [knowledge], what they teach at school. The kids that are finishing school are the better informed...I get informed through the newspaper or in my house, through my children that are professionals". (I:3, p.26).

Also linked to physical preparedness, the housing conditions of the community are mixed; affluent households that have undergone repairs or restorations co-exist with low-income

housing that is built precariously. The identified increase in the number of `cuarterias' in the community has exacerbated this situation. As stated by an interviewee:

"Members of this community are home owners, but their houses are collapsing...the zinc roofing falls apart all the time; there are water leakages because the houses were built in the 70s and 80s..." (I2, p.17)



Examples of vulnerable housing and weak infrastructure, Barrio Luján

Infrastructural degradation was also identified as a source of vulnerability that erodes community robustness. Linked to the closure of the Dos Pinos factory and the subsequent abandonment or their buildings, an interviewee explained:

"The Dos Pinos altered the course of the river Ocloro to satisfy the needs of their productive activities, and because of that, and the structures built adjacent to it, the area is flooded during the rainy season, generating risk for the neighbours. That infrastructure was abandoned, wild vegetation has grown, and homeless people and drug addicts are now using those buildings. That has created a new situation of risk of dengue due to the accumulation of garbage, and also in terms of security, because there have been thefts in the area". (I:4, p.35)



Former Dos Pinos factory, Barrio Luján

Another factor that deteriorates robustness and local preparedness is the **lack of awareness about local risks**, and about **policies and regulations**, including territorial plans, that could help mitigate or avoid risk in the case of a potential climate change-related or other events. As reflected in this statement:

"No, we don't have any [local policies or regulations to reduce risk]...because here there is no danger of flooding and that kind of things, we don't have them" (I:1,p.7).

Interviewees working with the local emergency committee were aware of some territorial management regulations to reduce risk (e.g. a regulation that prevents construction on the river basin), but pointed out that those regulations are not well known or have not been implemented. According to a member of the Risk and Disaster Prevention Group:

"(...) At plain sight [the flooding risk associated with the location of the former Dos Pinos factory] doesn't have a solution, because the building is located on the river basin...There is a law that is 50 or 60 years old, that states that buildings should not be built there, but people don't know that part of the building is on the basin..." (I:2, p.2).

Findings also indicate that increasing insecurity has affected the community especially in relation to **deteriorating perceived institutional efficacy/capacity** (e.g. municipality, police) and **local governance**. When asked about the main problems faced by the community, a member of the police stated:

"Currently we are seeing a lot of assaults at night, a lot![emphasis]. On Saturday night there were three in this area, in this quadrant, three thefts at night. This is what people have been saying, that they can't go out at night because of the insecurity..." (I:1, p.3).

#### Self-organisation

Interview findings suggest that the community's capacity to self-organise in emergency situations is perceived locally as being weak or insufficient. As expressed by an interviewee:

"No, we are not ready to respond to disasters...we are just starting to prepare and to build capacity...we are doing small meetings, very sporadically..." (I:2, p.14)

The **limited capacity to self-organise** could be linked to low levels of awareness and risk perception, given the fact that the community has not experienced shocks or emergency situations of considerable magnitude. As an interviewee explained:

"There is a communal room in Barrio Lujan, because there is a neighbourhood association. It is of 'medium' to 'low' level...they are seniors members who meet, but it is on a voluntary basis...they don't have a lot of knowledge...they meet once a week. The room is rented for birthdays and activities...Very, VERY [emphasis] few people use the room to have meetings aimed at helping the community. We need to do that, but because we haven't had an acute emergency situation, we haven't done it" (I:3, p26).

Suggesting a link between low self-organisation capacity and **low levels of risk awareness** in the community, a member of a local institution added:

"My opinion is that, generally, as 'Ticos' [colloquial term for a native of Costa Rica] that we are, until something has already happened we don't think about organising ourselves. We believe that we are 'immune' to bad things happening to us. So, I feel that, because nothing 'big' has happened, and it is not expected to happen, because there is no 'latent risk' [emphasis], [community self-organisation] has not been established ..." (I:7, p.67).

Beyond climate-related organisation, the low capacity to self-organise has affected local livelihoods' diversification strategies, as illustrated in the following statement:

"I would like that the Entrepreneurial Women's group of Barrio Luján' would get properly organised...but I don't know how. They prepare Caribbean food [for sale]. But they have to build their capacity, because they also need...permits from the Municipality and from the Ministry of Health because they are working with food...They think that it is only about getting a loan. But I would like for them to understand that there needs to be preparation, capacity building..." (I:2, p.21)

Another factor that suggests weakness in the community's self-organisation capacity has been the **lack of community engagement**, as explained by an interviewee:

"There is no culture of [self] organisation, of belonging to something, of helping, or being aware of programmes that we have...Or of doing new things for a social cause...People are always thinking about 'what can I [emphasis] gain from this'".(I:6, p.54)

Findings also suggest a link between the community's self-organisation capacity, and low levels of local leadership and resource mobilisation. When asked about local preparedness to respond to emergencies, a member of a local institution stated:

"No...There are some leaders....but [the community] does not have the capacity to mobilise...or, in my opinion, the knowledge to do it..." (I:7, p.65).

The community's ability to self-organise has been also affected by **demographic changes** taking place at the local level, including changes in resources that form the community's socioeconomic fabric. In this regard, interview respondents identified the growth of migrant populations and the emergence of new commerce/businesses in the neighbourhood, which have changed the traditional networks of trust and collaboration between long-term residents of the community.

Youth migration (i.e. youth leaving the neighbourhood to live in other/newer areas of the city or abroad) and the conversion of residential property into commercial establishments were also identified as factors that can undermine community self-organisation. As explained by a member of a local institution:

"Many [youth] are leaving, and there are offices being built...Some neighbours have moved and some houses have become offices, cafes, etc...And those [new] people are not going to get involved with the community, obviously they are going to identify with the community where they live, not with Barrio Luján" (I:7, p.68)

The analysis of interview data suggests that the geographical proximity of institutions such as the Fire Department can create **dependence** and a false sense of security, thus reducing the

perception of risk and the community's motivation/incentives to self-organise. Illustrating this perception, an interviewee stated:

"The community is not prepared to respond in cases of emergency...Despite the fact that we have the Fire Department here, and that they are very efficient"... (I:1.p6)

A member of a local institution added:

"The school used to invite us to participate in capacity building events, but now...now that they have the Fire Department located in the middle of the neighbourhood, they believe that they are 'the salvation'!...What they don't understand is that the firemen are not there to 'save everybody', but you have to seek protection or take measures on your own...So that communication is not there". (I:1, p.8).

Interview data suggests that the physical presence of certain institutions in the community is often automatically equated with local preparedness and capacity to respond to shocks and emergencies, including climate change-related impacts. After stating that the community is 'definitely' prepared to respond the emergencies, an interviewee explained:

"Just by having a Fire Department – how many communities wouldn't like to have one? ...Immediately you coordinate with them emergency plans, how are we going to manage [the situation] in case of an earthquake or fire, where to evacuate people..." (I:5, p.44)

No evidence was found on the existence of these kinds of plans or community training to face climate change-related impacts at the local level, which suggests a disconnection between the perception of preparedness, and the actual self-organisation capacity of community stakeholders.

#### Learning

Findings indicate a **lack of community training and awareness raising** activities about climate change in Barrio Luján. Capacity building has been mainly focused on emergency response to shocks/natural disasters (e.g. earthquakes) and limited to members of the local Emergency Committee and some of the local institutions (e.g. Fire Department and police), as illustrated in the statement of a member of a local institution:

"We have received training for those events [emergencies], but not with the community" (I:1, p.8).

In regards to awareness, many of the interviewees linked climate change and risk prevention with recycling and waste management, or dismissed the possibility of both short- and long-term impacts in the community. As members of a local institution stated:

"A: Like flooding or something like that? No, that doesn't happen here. B: And it never will!!" (I:1,p.4)

Linked to the above, respondents identified the **lack of sharing** of information and experiences about climate change, as explained by an interviewee:

"No, no, no [there is no knowledge sharing]... People know that there is a river here, so when it rains, they come just to see what happened to the neighbours, and to say "Poor you"...And then another storm comes, and they do the same: "Poor you", and then they go home. We do not share solutions...We are lacking awareness about that...". (I:2, p.17)

The **perception that risk is localised** in certain areas of the community (as opposed to the community as a whole) has acted as a disincentive to knowledge sharing. This suggests the
need to create awareness and foster a better understanding of the broader (e.g. long-term and indirect) challenges related to climate change impacts (e.g. health, infrastructure, habitat). In this regard, an interviewee stated:

"I believe that experiences are not shared because where we live we haven't experienced that...we haven't had the problem [flooding]. All the problems are in the lower part [of the community], but not on our side" (I:9, p.80).

Some interviewees perceive that the impacts of climate change are limited to the area of "El Vallejo" [anonymised name], as reflected in this statement:

"The problem [with climate change] is down there in the "Vallejo", when the river overflows and floods a number of houses that are there, adjacent to the river...besides that, climatic problems, no..." (I:6, p.50).



Examples of areas exposed to high risk of flooding, Barrio Luján

**Distrust** was also mentioned as a factor that affects local knowledge sharing, as explained by a member of the local group of risk and disaster prevention:

"We are starting to implement a census in the community...[to determine] the condition of the local infrastructure. But we are...waiting for an I.D. to be issued by the municipality, so people are not suspicious when they provide the information...Because people only share half of the information, because they feel distrust, they question why are we trying to find that out, and where is that information going..." (I:4, p.39).

This last aspect could be related to issues of information openness in the community, which are addressed under the attribute of Equality.

#### Redundancy

Interview findings suggest that resource redundancy in the community has been undermined by the closure of several factories that were important sources of employment and economic activity at the local level. In particular, respondents mentioned the effects of the closure of the Dos Pinos factory:

"We used to have two factories: the Dos Pinos, which arrived here 60 years ago and provided a big "boom" to the community in all aspects: commercial, job creation, social relations...It was well received by the community because it generated employment and

higher income...We also had a factory of refreshments, the "Navarra", and a soap factory, 50 years ago..." (I:3, p.22).

Another added:

"I feel that there was a significant loss when the Dos Pinos left [the community], because it is one of the biggest cooperatives in Costa Rica. It left a hole...that you can see even from here. It provided livelihoods for many people; you used to see many more people everywhere..." (I:6, p.59).

Data suggests that the closure of the Dos Pinos factory also had implications in the community's Robustness (e.g. weaker local infrastructure, loss of investment) and Scale (e.g. less interaction/social networking with neighbouring communities, as the factory's work force included residents of surrounding areas).

#### Rapidity

Interviewees identified the **lack of early warning systems** (EWS) in the community, which affects the speed with which community members can identify threats and respond accordingly. Risks associated with the lack of EWS are exacerbated by the community's demographic composition (i.e. a high percentage of senior people that would require longer evacuation time and further support), and by the infrastructural vulnerability of some areas of the community (e.g. houses built with precarious construction materials such tin roofs).

Findings also suggest a **low capacity to respond and act swiftly** in emergency situations, including the lack of information needed to **inform local decisions**. As explained by a member of a local institution:

"No, the community does not have that capacity [to respond and act quickly in the event of emergencies] because they haven't had the training. For example, I could not tell you that [in the case of an emergency] everybody would know where to go [to seek refuge or assistance]. Right now, nobody knows where to go. Some would come here, others would run over there...but there is no single, centralised location that everybody knows. So, if in this moment something happens, everybody would die, because there is no point where the Fire Department or any other institution could direct them to try to save them" (I:1,p.9).

When asked about the rapidity of the local response in the event of an emergency, a member of a local institution added:

"No...I feel that they [the community] are waiting for us [Fire Department] to take the initiative...and that [institutional initiative] gives them the cue to follow in the case of an emergency" (I:7, p.68).

#### Scale

Findings indicate that there is a **lack of collaboration** and of **effective communication mechanisms** between community members and local institutions (i.e. fragmented linkages between stakeholders from different scales). When asked about coordination of efforts with the community in non-emergency situations, a member of a local institution stated:

"The only communication that there is with us [local police] is when they [community members] need something...apart from that, they don't even know that we exist! (...). No [there is no relationship with the community]. We are divorced" (I:1, p.2, p.10).

The lack of collaboration between micro and meso level stakeholders includes initiatives in the field of climate change, as explained by a member of another local institution:

"No...I think that [climate change initiatives] are handled individually, as institutions...There are some small programmes like recycling...very small and superficial. Maybe by a company, or by the police...but it is very small". (I:7, p.67).

Data suggests that this challenge could be related to the lack of clear mechanisms to coordinate actions between scales in the event of shocks or disturbances. Suggesting a link with challenges of self-organisation, identified above, a member of a local institution stated:

"People only call us when there is a situation, or they come here [in person] to inform us about something. But there is no medium, or a leader from the community with whom we can communicate [in those situations]" (I:1, p.5)

Interviewees also mentioned lack of collaboration between institutions, as explained by a member of a local institution:

"In the local [health] clinic sometimes they have [training] events, but they never invite our institution to participate (...) Even though they have a lot of knowledge on that, they don't share it with us at all" (I:1, p.8).

Evidence indicates that intra-scale collaboration takes place primarily on a case-by-case basis, and in response to specific/localised emergency situations.

Interview findings also suggest a lack of awareness about the specific roles and responsibilities of local stakeholders/institutions in regards to climate change-related activities. As explained by a member of a local institution,

"We have started to do some [activities with the community], but it is limited. What happens also is that there are community leaders that want visibility, but that expect that we do all the work. And we can't do that (...)'' (I:7, p.65)

#### Diversity and Flexibility

Data suggests that many local stakeholders do not perceive 'change' (e.g. economic, climatic etc) in the community, and instead highlighted the permanence of long-term residents.

None of the respondents identified **innovative practices or initiatives** taking place in Barrio Luján. As expressed by an interviewee:

"There have been no changes in the community...it continues to be the same. It is a little bit more populated, but remains the same Barrio Luján. [In terms of innovation] there is nothing significant. No...on the contrary, I feel that there was a significant loss when the Dos Pinos left [the community]" (I:6, p.59).

Findings also suggest that local flexibility may be constrained by the lack of awareness about climate change impacts, including information needed for adaptive decision-making. As explained by a respondent:

"In terms of climate change...I have not seen a lot of 'desperation'. People are calm, they are not aware that we are causing all of this...because there is no information" (I:4, p.40).

Challenges related to flexibility could also be related to scepticism or **resistance to change**, and to the fact that Barrio Luján is an older community, with long-term inhabitants and senior members. When asked about the community's ability to adapt to change, an interviewee explained:

"No [it doesn't adapt well to change]. Because...well, I feel that, because it is an old neighbourhood...people think "I am fine the way I am, the less I'm bothered and the

less I get engaged, everything will be fine...Before we didn't used to have any problems, and we expect for that to continue"...(I:7, p.68).

In terms of innovation, findings suggest linkages between the lack of local innovation and **low youth engagement** in local projects and initiatives, as illustrated below:

"Of course [the community remains the same]. It is lacking the 'youth's injection'...or people with a broader vision about the community's problems, in order for innovation to happen" (I:7, p.68).

#### Equality

Participation in local groups is perceived as being limited, partly due to the **lack of youth engagement** in local activities, as reflected in the following statement:

"Women are the ones that participate...I have never seen youth there [meetings of local groups]...Youths do not participate in any of the projects of the community...in the Scouts, nothing more. (...) They don't integrate with older people...because they have a different mentality" (I:6, p.59).

One of the constraints identified in this regard is the **lack of openness and appropriate information dissemination** (e.g. in the case of the local community association), including interactions between community members and local groups about projects and activities. As explained by an interviewee,

"I feel that [the Association] has not known how to project itself to the community. It has not known how. Because the community, and I say this based on my experience working with the community, has lacked INFORMATION [emphasis] (...) For example, information about upcoming events of vulnerable women [the 'Entrepreneurial Women's group of Barrio Luján] in order to gather resources and support...The community needs to know that, but there are not reports about that" (I:2, p.20)

Findings evidence other factors that undermine the attribute of equality in Barrio Luján, including **socio-economic differences** within the community, and **marginalisation** of certain groups. In this regard, interviewees mentioned an increase of areas in the community where more vulnerable populations concentrate (i.e. 'cuarterias' or physical areas that are more densely populated, with temporary/fragile infrastructure, low sanitary conditions and poor access to public services), and the increase of homeless populations. As illustrated by a respondent,

"The area of "El Vallejo" is divided in two parts. A HORRIBLE [emphasis] part that is known locally as "Agudo Street" (...) And another part that is where, supposedly, "the decent people" live...And in plain sight you can see that Barrio Luján is a "healthy" neighbourhood, sort of speak, that some people have been displaced towards that side [El Vallejo]...like getting them out of what constitutes the neighbourhood" (I:1, p.2)



Infrastructural weakness and housing differentials, Barrio Luján

Interviewees also identified the marginalisation of vulnerable members of the community, such as seniors and children. In this regard, an interviewee explained:

"A problem that we need to deal with is the issue of seniors...we do not have places where seniors can go to learn and to be entertained...Another priority are the children. We do not have a place, a public day-care facility, with the support of an institution, for mothers that need to work [particularly] migrants that come to live in the neighbour (...) (I:3, p.23).

The analysis presented up to this point has shown evidence of attributes that strengthen the resilience of Barrio Luján, mainly in response to shocks and short-term stressors. The analysis has also revealed factors that undermine or weaken the community's potential for resilience-building, and thus constrain its capacity to effectively withstand, cope with and adjust to change and uncertainty. These findings are visualised in the following sub-section.

## 2.3. Visualisation of Community Resilience Benchmarking

The visualisation of resilience attributes found in Barrio Luján is based on discourse analysis conducted on interview transcripts: quantifying the number of times that issues related to the resilience attributes were mentioned during the interviews with community stakeholders. (Detailed findings of the discourse analysis are summarised in Annex 5.)

The first visualisation – shown in Figure 7 – indicates the total number of times an attributerelated issue was mentioned. This provides an indicator for the relative salience of resilience attributes within the community. In aggregate terms, the foundational attributes of resilience – robustness, self-organisation, and learning – were mentioned more often than the enabling attributes – redundancy, rapidity, scale, diversity, flexibility, equality. At least for Barrio Luján, then, there is support for the notion that foundational attributes draw greater attention and concern.

Looking at individual attributes, the evidence shows robustness was present in the minds of community stakeholders far more often than any other resilience attribute, with self-organisation some way behind, and then other attributes clustered relatively together though with least discussion of diversity and flexibility.

Although not a direct measure, we can take this to be some type of proxy for the relative importance and value that stakeholders for this particular community – at least on the basis of this particular data-gathering approach – ascribe to the different attributes of resilience. Pushing further, and making the connection more tenuous, it could be argued that Figure 7 gives some sense of prioritisation for action; prioritising the attributes with higher salience. However, that requires further data.



Figure 7. Relative salience of resilience attributes, Barrio Luján stakeholders

A starting point for that further data is shown in Figure 8: the breakdown of overall mentions into those related to resilience attribute strength and those related to resilience attribute weakness. There are some positive aspects to this data – in particular, the community is seen to have strengths in the areas of robustness (thanks to a certain strength of local institutions, some physical preparedness, and some broader networking) and self-organisation (again thanks to the collaborative nature of some community institutions, and trust among some of the longer-term residents).

However, a more overarching conclusion is that concerns about resilience weaknesses significantly outnumber discussion of resilience strengths within the community: by almost a ratio of two-to-one. With an aggregate score of -79, stakeholders rate community resilience overall as weak. Hence, there is a firm imperative for actions seeking to strengthen community resilience since stakeholders hold an overall perception of shortcomings in Barrio Luján's resilience.



Figure 8. Relative salience of strength vs. weakness of resilience attributes, Barrio Luján stakeholders

There are two ways in which this data could be used to prioritise resilience interventions. Figure 9 removes the strengths and orders attributes just in terms of the relative extent of weakness identified by stakeholders. Figure 10 subtracts weaknesses from strengths to provide an overall view from the stakeholders of whether particular aspects of resilience are "in credit" or "in debit" within the community.



Figure 9. Relative prevalence of resilience attribute weakness, Barrio Luján stakeholders



Figure 10. Summative view of resilience attribute strength/weakness, Barrio Luján stakeholders

Taking the data from Figures 9 and 10 together, we can summarise that interventions seeking to strengthen community resilience in Barrio Luján should prioritise actions that build robustness. Following this comes a set of roughly-equal second-tier priorities to address community diversity, learning, equality and scale. Third-tier priorities will be actions on rapidity, flexibility, redundancy and self-organisation. All these will improve the community's capacity to withstand, cope with and adjust to the impacts of stressors, including climate change.

Having assessed local resilience based on the perceived strengths and weaknesses of the community, the following section will focus on the role of ICT tools in Barrio Luján's resilience.

# Section 3. RABIT Findings: ICTs and Community Resilience

This section presents an assessment of the linkages between ICTs and resilience (i.e. eresilience) in Barrio Luján. The findings presented are based on analysis of survey responses. Where possible, the results are complemented and validated with interview and focus group data.

The section is structured in three main parts. The first presents an overview of ICT access and use in the community. The second analyses the role of ICTs in regards to the nine resilience attributes that constitute the conceptual core of this investigation (Table 1), while the last subsection presents a series of data visualisations of the findings, including an overview 'resilience wheel' to facilitate the identification of priority areas for action on e-resilience (addressed in section 4).

## 3.1. ICT Access and Use in Barrio Luján

This sub-section presents the findings related to local access and use of mobile phones (3.1.1) and the Internet (3.1.2) in Barrio Luján, based on analysis of survey data.

## 3.1.1. Mobile Phone

Not surprisingly, survey results indicate that the most widely ICT adopted at the local level is the mobile phone<sup>5</sup>. 96% of survey respondents reported owning at least one mobile phone, while 18% own two or more.

In terms of **mobile applications usage**, 94% of survey respondents use their mobile phone to make and to receive calls. The majority of users share and receive information via text messages (SMS) (78%), and more than half use their mobile to access the Internet (56%) (Figure 11).



This level of usage suggests not only the diffusion of more advanced models of handheld devices (i.e. with smartphone/Internet capabilities), but also a broadening potential of the mobile phone as a medium to access and share knowledge and information.

The main **perceived benefit** of mobile usage identified in the survey was improved ease and speed of communications (41% of the responses), followed by connectedness and accessibility

<sup>&</sup>lt;sup>5</sup> In terms of ICT (mobile and the Internet) access, only two respondents (4% of the total sample) reported not having access to these technologies, due to financial constraints.

(21%), which includes the mobile's role in 'shortening distances', and emergency communications (16%). Additional benefits identified in this open question correspond to Internet accessibility and work/business-related communications (11% respectively)<sup>6</sup> (Figure 12).



Findings suggest that the mobile phone is playing a role as a backbone for social networking and 'social connectedness' at multiple levels, as benefits related to 'shortening distances' and being 'easier to locate' indicate.

Survey results also suggest that there is local awareness about the role of mobile phones in emergency communications, an increasingly relevant use as part of early warning systems (EWS) and climate change monitoring. This level of awareness may be linked to mobile usage during episodes of flooding of the local river (as per interviews and focus group findings).



Mobile phone users, Barrio Luján

<sup>&</sup>lt;sup>6</sup> Survey respondents (mobile phone users) were asked about the 'perceived benefits of mobile usage' through an open question. A total of 56 responses were received (in some cases two per respondent) and considered as part of the categorisation.

In terms of the **perceived problems or disadvantages** associated with mobile phone usage, 25% of survey responses<sup>7</sup> identified issues of 'addiction' and 'dependence', including social isolation, distraction and waste of time. 21% of the responses did not identify any problems related with mobile phone usage. Respondents identified problems related to personal insecurity (i.e. increased exposure to robberies and usage for illegal activities), loss of privacy and increased gossip, and connectivity problems (e.g. signal problems, lack of coverage) (15%, respectively), followed by cost issues (e.g. cost of 'topping-up'), mentioned in 6% of the responses (Figure 13).



While these results indicate an overall positive perception of mobile phone usage, the problems identified evidence awareness about the negative, unintended and psychosocial effects of mobile usage. This was suggested by the identification of effects such as higher levels of 'social isolation', greater difficulty in establishing 'real communication' with other people, as well as the loss of memory due to a higher dependence on the mobile phone (e.g. for contact numbers and other information).

Risks associated with addiction and dependence, security and loss of privacy, are perceived by respondents as being higher than problems associated with physical infrastructure and financial resources (e.g. connectivity and cost constraints).

Some of these challenges are reflected in the following interview statement:

"Nowadays, kids can't live without it [ICTs], definitely...Even if they don't have [access to the Internet], they manage to get it...and spend all day doing that, playing and sending little messages! [frustration]. I even think that, in the hands of certain people, that is not the best. For example [if they send messages saying] "the police is coming, hide the drugs"...Not all the uses are positive" (I:9, p.79).

## 3.1.2. Internet

Survey results indicate that 76% of the respondents have access to computers or tablets with Internet connectivity. Most of the access takes place at home (68% of all respondents; 89% of those with Internet access via PC/tablet), followed by cyber-cafes (6%) and others (2%).

<sup>&</sup>lt;sup>7</sup> Survey respondents (mobile phone users) were asked about the 'perceived problems or disadvantages of mobile usage' through an open question. A total of 48 responses were received and considered as part of the categorisation.



Internet café located in a local bookstore, Barrio Luján

Respondents without Internet access (24%) cited as the main reasons the lack of capacity (33%), cost (25%), personal preferences/scepticism (e.g. creates addiction) (25%), and access to other technologies that meet their communication needs (i.e. mobile phone and fixed telephone line) (17%).

In terms of **Internet usage**, more than half of the survey respondents reported using the Internet for social networking (58%) and e-mail (52%), followed by school homework (44%) and work-related purposes (36%). Other uses were mentioned by 26% of the respondents (Figure 14).



In terms of the **perceived benefits of Internet usage**, responses to this open question suggest four main areas of usage: information access and research (53%), networking and communication (25%), work-related purposes (11%) and other uses  $(11\%)^8$  (Figure 15).

<sup>&</sup>lt;sup>8</sup> Survey respondents (Internet users) were asked about the 'perceived benefits of Internet usage' through an open question. A total of 47 responses were received and considered as part of the categorisation.



In regards to the first category, respondents use the Internet to access resources such as technical information, software and manuals, news and images, and to conduct research for school assignments. In the category of 'networking and communication', respondents mentioned the feeling of 'closeness' to family and friends, while 'work-related purposes' includes Internet usage to find job opportunities. 'Other uses' include making payments and entertainment.

Survey results suggest significant local awareness about the informational potential of ICTs such as the Internet. The fact that information access and research were recognised as the main benefits of Internet usage constitutes an interesting result, particularly considering the survey's demographics (i.e. the majority of respondents being 46 years old or older, and between 15 and 25 years old).

Reflecting some of these perceived benefits, an interviewee stated:

"The Internet benefits the community because it allows users to look for job opportunities, and to communicate with friends and family, for example with those that live abroad" (I:10,p.85).

In regards to the **perceived disadvantages or problems of Internet usage**<sup>9</sup>, the main issue identified are security-related risks (particularly children's exposure to inappropriate content, hackers, viruses and scams) and loss of privacy (including gossip), as identified in 46% of responses. They were followed by technical issues (e.g. connectivity problems and slow connections) (mentioned in 17% of the responses), and addiction (e.g. weakening of family bonds, distraction and waste of time) (mentioned in 15% of the responses). 17% of the users did not identify any problems or disadvantages with Internet usage. Only 5% mentioned problems related to the cost of Internet access (Figure 16).

<sup>&</sup>lt;sup>9</sup> Survey respondents (Internet users) were asked about the 'perceived problems or disadvantages of Internet usage' through an open question. A total of 41 responses were received and considered as part of the categorisation.



In addition to the challenges identified by survey respondents, interview data suggests the lack of capacity-building opportunities (especially for senior members of the community) as a barrier for ICT access and use in the community. Interview respondents identified the crucial role of youth in motivating usage and helping to bridge capacity gaps, as explained by a member of the local emergency committee:

"Well, we are just starting [to use ICTs]. The only one that has helped us with that is our secretary...she is the one that is better informed about it, because she has two daughters who use the Internet and all that, so she knows how to use it...'whatsup', and all the things that we knew nothing about...And nowadays I ALREADY KNOW [emphasis] how to start the Internet...but I don't have a computer at home". (I: 2, p13)

When asked about the main barriers to Internet use, another interviewee stated:

"First, because the mobile phone that I have is not suitable for that [Internet access], and then, because I have never learned, and I have never had anybody that could teach me...I don't have a computer at home. The price of the equipment is the first barrier...and the price of Internet access" (I:6, p55).

**In summary,** findings related to mobile phone and Internet access and usage in Barrio Luján indicate that ICT tools are widely adopted, and their usage is diverse. Although mobile phone use is predominant, Internet applications are playing a role in the community's social networking and information access. The perceived negative impacts of ICTs are useful reminders of the need to further understand the risks involved in the use of these tools (e.g. security and privacy), and of the need to address those perceptions as part of further resilience strategies in the community.

#### ICT ACCESS AND USE: FOCUS GROUP FINDINGS

**Information and communication** were identified as the main possibility/solution to the vulnerabilities identified during the focus group session, and as the second highest related to community 'goals'. This suggests that community stakeholders have an overall positive perception of ICTs (i.e. as a 'possibility/solution'), and also confirms the local relevance of exploring the role and potential of ICTs in the community.



Ketso content related to the role of ICTs, Community Focus Group

In terms of areas of **ICT potential**, focus group participants identified as the key areas: awareness raising and education, including waste management issues, followed by community self-organisation (e.g. coordination of local activities), communication and information sharing, and collaboration/coordination of actions with different stakeholders (e.g. municipality, donors) (Figure 17).

Other areas of ICTs' potential include enabling rapid communication and dissemination of alerts, as well as strengthening local trust and credibility, and (emergency) preparedness.



Very little evidence emerged during the focus group discussion in regards to the negative impacts of ICT usage, and the challenges that need to be overcome to foster the effective use of these tools in local resilience. Only two issues related to ICT challenges were identified

during the discussion, referring to 'fear' of using the technology, and the lack of economic resources to acquire it.

## 3.2. ICTs and Climate Change Resilience in Barrio Luján

This analysis presented in this sub-section links the survey findings with the attributes of resilient communities, identified in Table 1.

## a. Robustness

In terms of robustness, the research aimed at identifying the role of ICT tools in the community's ability to maintain its characteristics and performance in the face of environmental shocks and fluctuations. Evidence of ICT's role was sought with regards to three resilience markers: (a) physical preparedness, (b) institutional capacity, and (b) multi-level governance and networking.

Findings suggest a low level of ICT usage to improve the **physical preparedness** of the community to climate change impacts. 71% of survey respondents never use ICT tools to look for climate-related information (Figure 18), and only 36% reported using the Internet and mobile phones to access information in support of emergency preparedness (Figure 19).



More than half of survey respondents (51%) use ICTs to report problems and emergencies to institutions or authorities (Figure 20), which suggests a potential contribution of ICT tools to **institutional response capacity** and **multi-level governance** (by reducing barriers to communication among community members and institutions, and by helping to form networks).



Data indicates that ICTs are used to contact institutions that operate at the local, the municipal and the national levels (Figure 21). This suggests a link between ICT usage and the

resilience attribute of scale, which will be addressed later in the section. 30% of the responses mentioned the use of ICTs to contact "911" (national emergency number), while 9% use these tools to contact the local police, the fire department, and the Costa Rican Institute of Aqueducts and Sewage (Spanish acronym AyA), respectively. These results were followed by the national electricity company (Spanish acronym CFL), the municipality, the National Emergency Commission and the National Institute of Electricity (Spanish acronym ICE) (6%, respectively). Other institutions (e.g. SENASA, MOPT, bank, Red Cross and hospital) were mentioned in smaller percentages (accounting for the remaining 19% of the responses).



ICTs and Robustness in Barrio Luján

- ICTs are contributing to robustness by helping to improve institutional response capacity and multi-level governance in and around the community, considering that more than half of survey respondents use these tools to report emergency situations to national, municipal and local institutions.
- Survey results provide evidence of ICT use towards physical preparedness (30% of respondents use the Internet to look for climate-related information). At the same time, their use towards networking between community members and multi-level institutions suggests a role of these tools in the community's ability to maintain its characteristics and performance in the face of environmental shocks and fluctuations. However, the high percentage of calls to the national emergency number (911) could suggest that response mechanisms remain centralised, and that emergencies reported include non-climatic stressors (e.g. insecurity, accidents).
- Overall, ICTs' contribution to the community's physical robustness to climate change is limited, based the low levels of ICT usage to access climate-related information, and strengthen local preparedness/responses to climatic stressors. This constitutes an area of potential for future action.
- Further research needs to be conducted on the role of ICTs in institutional resilience, including institutional capacity building and governance strengthening, which were beyond the scope of this pilot.

## b. Self-organisation

In regards to self-organisation, the research sought to identify the role of ICT tools in supporting the ability of the community to independently re-arrange its functions and processes in the face of external disturbances, without being forced by external influences. Data-gathering focused on identifying ICT's role with respect to three resilience markers: (a) collaboration/consensus-building and participation, (b) social networks, and (c) local leadership and trust.

In regards to the first marker, 77% of survey respondents have never used ICTs to **organise or participate** in local activities or projects in Barrio Luján. 16% reported using ICTs 'sometimes', and 7% 'always' (Figure 22).



Corroborating these findings, a member of the 'Entrepreneurial Women's group' of Barrio Luján explained:

"We can use ICTs to better organise our communications...But in order to 'selforganise', we are lacking many tools...[we need] to learn how to manage the group, how to manage the objectives and the problems that we need to face...We are lacking guidelines or even a policy that provides us with directions, that broadens our knowledge of what could be achieved". (I:6, p.55)

Community members reported using various applications (e.g. Facebook, Twitter and Instagram) for **social networking**. The most popular social networking site among community members is **Facebook**, as reported by 88% of survey respondents (Figure 23).



Survey results suggest that Facebook usage is focused on two main networking purposes: to communicate with friends and family, and to keep in contact with broader networks through

instant/next-to-real-time exchanges via chat or messages to share 'gossip'. Each of these areas account for 38% of the responses (Figure 24).

While the networking uses identified could be categorised under the broader umbrella of 'communication' and may overlap in practice, data suggests the existence of slightly different types of communication purposes, some related with the 'immediacy' of the exchanges, and/or with the type of content shared. In this respect, 14% of respondents use Facebook to manage and share content (e.g. update their personal profile, send pictures), followed by lower percentages that use it for entertainment purposes, to work, and to participate in groups.

Other examples of Facebook usage related to Barrio Luján were found through an Internet search conducted as part of RABIT's implementation. Pictured below, examples include institutional Web sites (e.g. school, church, fire department), marketing of local services (e.g. local restaurants, bakery), service offers (e.g. local real estate) and picture sharing (e.g. of Barrio Luján's original church).



Only 20% of survey respondents use **Twitter** (Figure 25). Three main areas of usage identified correspond to accessing news and information (63% of Twitter users), entertainment (25%), and sending messages (12%) (Figure 26).



16% of respondents use **Instagram** (Figure 27) for two main purposes: to share photos (67% of users), for entertainment and networking purposes (16%, respectively) (Figure 28).



62% of survey respondents reported using **Youtube** (Figure 29). Data suggests that usage is linked to two main purposes: to access videos (45% of users) and to access music (32%). Lower percentages of usage were reported for entertainment purposes (13%) (an area that may overlap with the two previous ones), and information and research (10%).



Other online networking applications mentioned by respondents include Whatsup, Pinterest, Skype, Google, Mercado Libre, Badoo, Taringa and Transito, all in smaller percentages than those reported above.

In regards to the role of ICTs in **trust-building**, only 32% of the respondents consider that ICT tools are contributing to trust-building (Figure 31), confirming earlier findings (sub-section 3.1) related to the negative impacts of technology usage (e.g. addiction/dependence, security concerns, loss of privacy).



Scepticism about the role of the Internet in building trust among community members is reflected in the following interview statement:

"We need to try to become a more active community, more dynamic...but to avoid saying "I have Internet and it is only for me...I play with it and nothing else matters, who is beside me, it is only ME [emphasis] with the Internet and nobody takes it away from ME [emphasis]"...That is a negative perception, but some people are experiencing it...That is how we are nowadays...We are 'connected', but only with another world, with the outside world. We don't care about the lives of others unless we meet them through the Internet"...(I:2, p.18)

#### ICTs and Self-organisation in Barrio Luján

- Findings suggest that the role of ICTs in the community's capacity to self-organise is starting to emerge, particularly through the adoption and use of social networking tools. While the use of ICTs to participate in local projects and activities is low, data shows a high level of engagement in (real-time) information and knowledge exchange through Web 2.0/content-generation applications such as Facebook, Twitter and Instagram.
- While the percentage of users of the last two applications remains lower than 50%, their adoption indicates an emerging modality of information and knowledge sharing in the community. These practices involve more sophisticated ICT usage (e.g. online content management and sharing, real-time information dissemination, access to – and potentially production of – content in new formats), which could contribute to self-organisation purposes.
- "Entertainment" was not identified as a key purpose of usage for any of the social networking tools identified, which could suggest a growing awareness about the organisational potential of Web 2.0 applications.
- The low perception of ICT's contribution to trust building suggests the need to gain a deeper understanding of the potential and the risks perceived by local stakeholders in regards to ICT usage. Findings suggest that perceived risks and disadvantages of using ICTs (e.g. security, dependence) could act as a barrier to the effective role of these tools in support of community leadership and self-organisation.

### c. Learning

In regards to learning, the research sought evidence about ICTs' role in the community's ability to generate feedback and experiment, as well as to strengthen local skills and capacities. The role of ICT tools was explored in regards to three main markers that are indicative of the 'learning' capacity of resilient communities: (a) capacity building, (b) access and use of new and traditional knowledge, and (c) reflective thinking.

21% of survey respondents reported accessing **capacity building** opportunities through the Internet (Figure 32). Topics of online training relate to electronics and mechanics (30% each), health and beauty (20%), followed by English and other technical training (10%, respectively) (Figure 33).



The relatively low access to online training is consistent with findings related to purposes of Internet usage in Barrio Lujan, and constitutes an area of potential considering that 76% of the respondents reported accessing Internet-connected computers or tablets, most of them at home (68%) (sub-section 3.1.2).

Areas of online training reported in the survey suggest an existing demand for capacitybuilding opportunities on technical fields that could help to improve local livelihoods (e.g. areas that could be applied to small business and local service provision in the community).



Only 11% of survey respondents use the Internet or the mobile phone to **identify ideas for community improvement** (Figure 34).

No evidence was found on ICT usage to **access traditional knowledge**, including traditional adaptive practices to climatic stressors, or towards **reflective thinking**<sup>10</sup>. Although an assessment of ICTs' role in strengthening these markers would require the compilation of further data, findings on Internet usage can provide some indications of potential contributions to these areas.

For example, the main Internet uses identified previously (sub-section 3.1.2) were information access and research, networking and communication. These types of usage could foster reflective thinking in various ways: by fostering searches for reasons and evidence on specific topics, by providing access to new areas of enquiry, by stimulating intellectual curiosity, by

<sup>&</sup>lt;sup>10</sup> For the purposes of this study, reflective thinking involves an active and careful assessment of what is known, what needs to be known, and how that gap can be bridged (Dewey, 1933).

offering new online learning environments, by facilitating access to online social-learning and peer-group environments, by offering new tools to express opinions (e.g. online videos, online photo-sharing platforms), see other points of view, and reflect upon the users' own opinions (e.g. blogs, online discussion groups).

In regards to the mobile phone, the main benefits identified in sub-section 3.1.1 include higher speed of communication, improved accessibility and emergency contacts. These types of uses are more difficult to link with reflective thinking, understood as a process that would require deeper levels of information exchange, time and appropriation.

#### ICTs and Learning in Barrio Luján

- Findings suggest that, despite the perceived benefits of Internet usage to access information and conduct research (sub-section 3.1.2), the learning potential of this tool is not realised in practice, or at least not towards learning that has translated into community improvements (such as measures to mitigate or adapt to the impacts of climate change).
- The level of ICT usage in capacity building remains relatively low, and is mostly focused on online training about technical subjects. This could be linked to the interest of community members to supplement their income or diversify their livelihood options, and thus related to the resilience attribute of redundancy (explored below).
- ICTs' contribution to learning is an area of great potential in Barrio Luján, particularly given the home-based access to computers or tablets with Internet access.
- The potential contribution of ICT tools to learning (e.g. capacity building, access and application of new/traditional knowledge, reflective thinking) could be constrained by the perceived disadvantages of these tools at the local level (e.g. security concerns, addiction/digital scepticism, connectivity problems), reported in sub-section 3.1. Efforts to foster resilience in Barrio Luján should address these issues.

### d. Redundancy

In regards to redundancy, understood as the extent to which community resources and institutions are substitutable in the event of a disruption or degradation, the research explored ICT's role towards three resilience markers: (a) resource spareness, (b) functional overlaps and interdependency, and (c) resource substitutability.

Related to ICTs' role towards **resource spareness**, 30% of survey respondents reported using the Internet or mobile phone to generate additional financial resources to their normal income (e.g. using ICTs to receive remittances or for business opportunities) (Figure 35).



While ICT usage to generate resource spareness remains low in Barrio Luján, data suggests an emerging awareness about the livelihood potential of these tools. This potential could help to generate additional resources to strengthen climate change preparedness and adaptation measures in the community (e.g. resources that could be invested in improving housing infrastructure to better withstand the impact of flooding, strong winds and precipitation).

Illustrating the livelihoods potential of ICTs at the local level, a member of the Entrepreneurial Women's group of Barrio Luján stated:

"One of our goals is to learn how to use the technologies [the Internet]...The purpose is that, when we have our business, that is going to help us progress...It is a medium to help us communicate, and to market our products" (I:6, P.52).



ICT-related service provision in Barrio Luján: Web access (left) and computer and mobile phone repairs, Word and Excel documents, and technical advice (right).

In regards to **resource substitutability**, almost half of survey respondents (49%) use the Internet or mobile phone to access resources in emergency situations (e.g. government assistance, donations, support from family and friends) (Figure 36). This percentage is significant, as it indicates that community members do not rely on a single source of support, but instead use ICTs to access a variety of sources that could be substitutable, and that could allow them to cope more effectively with the effects of climatic emergencies or disruptions.



Data also suggest a role of ICTs as enablers of **functional overlaps and interdependency** at the local level, by contributing to the redundancy of institutions and organisations (e.g. markets). One example is the use of the Internet to identify/access job markets (as reported in discussed equality below), thus broadening/complementing existent channels. This type of

redundancy can improve the community's ability to operate amidst shocks and disturbances, such as those related to climate change.

#### ICTs and Redundancy in Barrio Luján

- Findings suggest that ICT tools are starting to contribute to the generation of financial resources (e.g. through livelihood diversification) that could potentially be used to strengthen the community's capacity to cope with climate change impacts (e.g. generation of spare income that could be used in the construction of flood defences or better infrastructure).
- ICTs are facilitating access to alternative support mechanisms (e.g. social networks of friends and family) and financial resources that can be used to cope with emergency situations (e.g. government donations).
- Internet and mobile phones are also offering new/redundant channels for institutions and organisations to operate at the local level (e.g. access to job markets), thus helping foster functional overlaps to mitigate the impacts of acute shocks and long-term change.

### e. Rapidity

In regards to ICTs' role towards rapidity, or the speed at which assets can be accessed or mobilised by community stakeholders to achieve goals in an efficient manner, the research focused on three resilience markers: (a) rapid resource access, (b) rapid resource assessment/coordination, and (c) rapid resource mobilisation.

70% of survey respondents reported that ICTs have speeded up their access to support (e.g. from neighbours, family) in emergency situations (Figure 37), suggesting the role of these tools for **rapid resource access and coordination**. This confirms previous findings (subsection 3.1.1) that suggest that 'rapidity/speed of communication' constitute the main perceived benefits of mobile phone usage.



Suggesting a more limited role of ICTs in one important type of **rapid resource assessment** and **mobilisation**, only 26% of survey respondents reported using ICTs to access early warning systems (EWS) (Figure 38).

#### ICTs and Rapidity in Barrio Luján

- Findings suggest that ICTs are increasing the speed of information flows, transactions and services in the community, particularly in the case of local responses to acute shocks (e.g. natural disasters, flooding).
- ICTs' role is associated with rapid communication with local, municipal and national institutions (as reported in discussing robustness, above), thus enabling faster access to, or mobilisation of financial and human support.
- Interview data indicates that ICTs can speed up the accessibility of information needed for local decision-making and action, particularly in the case of early warning provision, and the coordination of response and recovery efforts by the local emergency committee (e.g. in the case of flooding). But this remains a potential not yet fully exploited.

## f. Scale

In relation to scale, understood as the breadth of assets and structures a community can access in order to effectively overcome, bounce back from or adapt to the effects of disturbances, the role of ICTs was explored based on three resilience markers: (a) multi-level networks, (b) resource access and partnerships, and (c) cross-level interactions.

In regards to **multi-level networks and partnerships**, the role of ICTs is low. 78% of respondents reported never using these tools to collaborate with new groups at the meso and macro levels, or as part of (multi-scale) projects related to emergency situations, or to community development (Figure 39). These findings confirm those reported earlier in the analysis (discussing self-organisation), where 77% of respondents reported never using ICTs to organise or participate in local activities or projects in Barrio Luján.

In cases where ICTs were used for this purpose (20% sometimes, 2% always), community members mentioned collaboration with the local Risk and Disaster Prevention Group (local emergency committee), the local cultural association, the national emergency committee, and the local school (Figure 40). These examples suggest that ICTs are starting to play a role as enablers of intra and inter-scale collaboration.



In terms of **cross-level interactions,** almost half of the respondents (49%) considers that the Internet or the mobile phone have enabled the community's contact with representatives

from different institutions, including the municipality, NGOs and groups/committees operating at the meso level (Figure 41).



Social media applications (e.g. Facebook, Youtube) are also playing a role fostering inter-scale linkages, as stated by an interviewee:

"Not so much within the neighbourhood, but when something happens somewhere else it is posted in Facebook, so you can see what happened, or watch a video with news about it". (I:6, p. 52).

#### ICTs and Scale in Barrio Luján

- Findings suggest that ICTs are playing a role as enablers of cross-level interactions (i.e. contact between community, meso- and macro-level institutions), helping to improve the scale of assets and structures to which Barrio Luján residents have access.
- But findings also indicate that these interactions do not necessarily correspond to intra/inter-scale partnerships, but are mostly focused on short-term responses/real-time information sharing (e.g. emergency reporting, seeking support) in emergency situations. This ratifies earlier findings of ICT usage to contact emergency services (911, police and fire department) (see discussion on robustness).
- Findings suggest that, for the most part, intra-scale interactions have not translated into collaborative projects. Consequently, the role of ICTs in the 'scale' of the community has not been approached from a systemic, longer-term perspective of partnership building and two-way knowledge exchange; an area of significant potential.

### g. Diversity and Flexibility

Closely linked to flexibility and combined into a single sub-property for the purposes of what follows, **diversity** refers to the availability of a variety of assets, institutions and institutional functions in the community, which enable a range of response options. **Flexibility** refers to the ability of the community to undertake different courses of actions, address problems and utilise the opportunities that may arise from change.

In regards to these two attributes of resilient systems, the analysis of ICTs' role focused on three markers: (a) different courses of action/emerging opportunities, (b) adaptable decision-making, and (c) innovation backbone.

85% of survey respondents stated that they use ICT tools to **identify options and opportunities** to improve their quality of life (Figure 42). This suggests a potential for ICTs to enable new, collaborative forms of community innovation, particularly social innovations.



Findings indicate a high level of ICT usage (45% always, 40% sometimes) to access new knowledge and to inform decisions (Figure 43), which suggests access to diverse/varied sources of knowledge and reference frames that could foster innovation (including innovative climate change responses).

The role of ICTs in the delivery of online training in areas such as electronics, mechanics, health and beauty (reported in the discussion on learning) can help diversify local livelihoods, spread the risk of external stressors (such as climate change impacts), and motivate competitive reorganisation at the community level.

Social networking tools such as Facebook, Youtube, Twitter, Instagram and Whatsup, adopted by community members to various levels (see discussion on self-organisation), can also help diversify local responses and action mechanisms by exposing users to varied sources of information and knowledge, helping to inform their decisions.

Reflecting the perceived linkages between ICTs and diversity, an interviewee stated:

"The community adapts itself to everything. We have applied the Internet and the mobile recharge [top-up services in local stores]...We are open to positive change" (I:3, p. 29).



Diversity of top-up service and Internet provides, Barrio Luján

The perceived benefits of Internet usage reported in sub-section 3.1.2 (i.e. information access and research, networking and communication, work-related purposes) suggest that ICTs are contributing to **flexibility** by enabling **access to knowledge from wider networks and sources.** This, in turn, can enable the identification of alternative courses of action. Findings reported in sub-section 3.1.2 also suggest the flexibility of ICT tools themselves, considering the variety of purposes of use and functionalities reported by community members (e.g. calls, text messages, search, games, e-mail, social networks).

#### ICTs, Diversity and Flexibility in Barrio Luján

- The level and purposes of ICT usage in Barrio Luján suggest that these tools are supplementing pre-existing communication mechanisms, transactions and services, thus contributing to the diversity of local information mechanisms and channels for resource access.
- Findings suggest a high level of local awareness about ICTs' role in the identification of new options and opportunities.
- By enabling access to diverse information flows (e.g. through broader social networking, inter-scale communications), ICTs can increase the diversity of options and potential actions for local decision-makers. Further data needs to be collected in this regard.
- Flexible ICT usage could facilitate greater flexibility in local decision-making processes (i.e. adaptable decision-making) by allowing community stakeholders to consider different courses of action, and identify potential opportunities emerging from change (thus providing the basis for innovation). However, there is no evidence on whether increased access to information and knowledge has, in fact, materialised in innovative actions and livelihood improvement, including adaptive actions.

## h. Equality

In relation to equality, or the extent to which the community provides equal access to rights, resources and opportunities to its members, the research focused on ICT's role in regards to three resilience markers: (a) strengthened competencies/ gaps' reduction, (b) inclusiveness, and (c) openness and accountability.

Survey findings suggest that the widespread adoption of mobile phones in Barrio Luján, and to a lesser extent of the Internet, have facilitated access to opportunities for vulnerable members of the community, helping strengthen more even distribution of local **competencies** and fostering **inclusiveness**. This result is particularly relevant given the strength of response from youth/elderly in the survey (sub-section 1.2).

66% of survey respondents agree that ICTs play a role in inclusiveness (i.e. access to opportunities for vulnerable members of the community) (Figure 44). Examples identified include expanded access to markets (i.e. job markets), training opportunities, business/work opportunities, support to community members with special needs (e.g. persons with physical disabilities, seniors), and access to new options, ideas and contacts (Figure 45).



However, interview data suggests that there are challenges of technology access and appropriation in Barrio Luján, particularly among senior members of the community who lack, among others, capacity-building opportunities tailored to their needs.

Identifying gaps in terms of capacity and technology access by vulnerable groups such as women, another interviewee added:

"In my opinion, the biggest challenge [with technologies] is that they [need to] reach more people...For example, I know that [the members of the Entrepreneurial Women's group of Barrio Lujan] don't have Facebook or anything like that...That is one of our objectives as group, to try to ensure that everybody has access to a computer without being afraid...Because everything that deals with technologies is limited to the mobile...but not the 'Smartphone', but that one [showing a first generation mobile] that is the type of phone that most of them use" (I:6, p.52).

Reflecting inter-generational barriers and inequalities in ICT access, one young interviewee added:

"For me, it is very easy to communicate with all my University mates by creating a Whatsup group and sending something...at once everybody receives it, and there is no problem in communicating with a lot of people...But for seniors, the people who are not using the technologies...it is complicated" (I6, p.54).

As a senior explained when asked about ICT usage during emergency situations:

"No, no. The use of technologies is not rooted yet in Barrio Luján. We have not been provided with tools [training] to use them. Because youth do not manage that issue yet [early warning systems], and the teenagers are the ones that are involved with technologies. The seniors, we are the ones that discuss the emergencies of the river Ocloro with the neighbours, and we are not using technologies because we don't know how...we don't have a local source to learn about it". (I:3, p.25)

Suggesting different mechanisms used by seniors to access information, the interviewee added:

"We are informed verbally...[for example] 'the electricity will be cut' or 'there will be water scarcity'...We hear about it in the radio when it is at the national level, or in the newspaper if it's going to affect the community..." (I:3, p.31).

Reflecting the existence of gaps in access to information in the community, another interviewee explained:

"[The community] adapts more or less well to change...More of less. Because it is not... not well informed about things. If they were all the time in the Internet...but...Here there are persons that do not know what is an Internet page, that maybe don't watch the news, or maybe cannot afford a newspaper...So you have to consider that" (I:5, p.46).

While the perception of ICTs' role in access to opportunities is mostly positive, their contribution to the '**sense of belonging**' to the community yielded different results. 77% of respondents do not perceive the role of ICTs in strengthening the sense of belonging to Barrio Luján (Figure 46). This is an important factor in local inclusiveness, as well as in the community's ability for self-organisation and intra-scale collaboration.



ICTs and Equality in Barrio Luján

- Evidence suggests an emerging role for ICTs in equality by strengthening local competencies for a range of different community members, thus enabling some reduction in gaps. ICTs are enabling opportunities to vulnerable populations by facilitating access to job markets, training and business opportunities, and appropriation by users with special needs. Social networking through ICTs is facilitating contact with extended networks, thus helping reduce marginalisation and exclusion.
- However, the impacts of the "mobile revolution" on community equality are less clear. No evidence was found on access to services such as e-banking or e-government through the mobile phone, or in regards to skills development via m-learning.
- In relation to social media use via mobile phones (e.g. Facebook and Twitter), no evidence
  was found on the use of these tools for campaigning or civil activism in the community, or
  on the role of ICTs in local monitoring for transparency and accountability in the delivery
  of social services.
- Most of the respondents do not perceive that ICTs contribute towards a 'sense of community belonging', suggesting that, while these tools may help equalise access to some tangible resources, they are not playing a significant role in terms of community identity and cohesion.

#### **ICT and Resilience Attributes: Interview Findings**

Most of the linkages between ICTs and resilience identified through the analysis of survey results were confirmed by interview respondents, as summarised in Table 7.

| INTERVIEW FINDINGS  |   |  |  |
|---|---|--|--|
| Linkages between Resilience Attributes and ICT Usage in Barrio Lujan  |   |  |  |
| MOBILE PHONE  | INTERNET  |  |  |
| <ul> <li>Self-organisation, Scale: Coordinate meetings/coordinate actions among members of the emergency commission and the local community association (calls and text messages) (I4, I9, I10)</li> <li>Robustness, Scale: Communication between local institutions and the community in emergency situations (I1, Community in emergency situatins))</li> </ul> | <ul> <li>Learning, Diversity, Flexibility: Web access to read news and use social media tools (Facebook, Youtube, Whatsup), disseminate information and communicate with peers (I6), information sharing (I2), entertainment (I9, I10)</li> <li>Robustness, Scale: E-mail used for communications between the municipality and the local emergency</li> </ul> |  |  |
| <ul> <li>I3), communication between the municipality and the local emergency committee (I2).</li> <li>Robustness, Scale: Social networking (I9), general communication (I8)</li> </ul>  | committee (I2).   |  |  |
| • <b>Rapidity:</b> Early warning (I5)   | <ul> <li>Learning: School homework (I8, I10)</li> <li>Redundancy: Support local livelihoods<br/>(e.g. access broader markets) (I6)</li> </ul>   |  |  |

• Equality, Learning: empowerment/build capacity of seniors (I2)

**Table 7**. Linkages between resilience attributes and ICT usage based on interview findings

Focus group findings confirmed the relevance of the project's area of focus, evidencing the need for further awareness in regards to local climate change impacts, the value of the notion of resilience, and the potential of ICT tools to strengthen the ability of the community to cope with and adapt to change. Participants (community stakeholders) identified various attributes of resilient communities, in particular issues related to self-organisation, learning, rapidity, scale and robustness.

## 3.3. Visualisation of e-Resilience Benchmarking

In order to benchmark the extent to which ICTs are currently contributing to resilience in Barrio Luján, we need to utilise the survey data in a way that provides a simple association between data and resilience. Table 8 below provides a summary from the data that was covered by the pilot survey. There are sometimes limitations in the correspondence between survey question and resilience marker; limitations imposed by time and other constraints experienced on the survey. Overall, though, the questions were designed to act as best-fit indicators given the survey constraints.

| Resilience   | Resilience                              | ICT Usage   | Aggregate |
|--------------|---|---|-----------|
| Attribute    | Marker                                  |   | Score     |
| Robustness   | Physical Preparedness                   | 29% use ICTs to look for climate                    | 39%       |
|              | Institutional Capacity                  | 51% use ICTs to report problems /                   |           |
|              |   | emergencies to institutions or                      |           |
|              |   | authorities   |           |
|              | Multi-Level Governance                  | 36% use ICTs to access information                  |           |
| Solf-        | Collaboration and Consensus             | 23% use ICTs to organise /                          | 48%       |
| Organisation |   | participate in activities and projects in           |           |
| organisation |   | the community                                       |           |
|              | Social Networks                         | 88% use social networking tools                     |           |
|              | Local Leadership and Trust              | 32% consider that ICTs contribute to trust-building |           |
| Learning     | Capacity Building                       | 21% use ICTs for capacity building                  | 16%       |
|              | New and Traditional Knowledge           | 11% use ICTs to identify ideas for                  |           |
|              | Deflective This line                    | community improvement                               |           |
|              |   | N/A   |           |
| Redundancy   | Resource Spareness                      | 30% use ICTs to generate additional                 | 39%       |
|              | Functional Overlaps and Interdependency | N/A   |           |
|              | Pesource Substitutability               | 19% use ICTs to access emergency                    |           |
|              |   | resources   |           |
| Rapidity     | Rapid Resource Access                   | 70% consider access to emergency                    | 48%       |
|              | Danid Descurse Accessment/Coordination  | support is faster with ICTs                         |           |
|              | Rapid Resource Assessment/Coordination  | N/A   |           |
|              | Rapid Resource Mobilisation             | 26% use ICTs to access early warning                |           |
| Scale        | Multi-Level Networks                    | 22% use ICTs in local collaborative                 | 35%       |
| Scale        |   | work  |           |
|              | Resource Access and Partnerships        | N/A   |           |
|              | Cross-Level Interactions                | 49% use ICTs to contact different                   |           |
|              |   | institutions  |           |
| Diversity &  | Different Actions/Opportunities         | 85% use ICIs to identify options and                | 72%       |
| Flexibility  | Adaptable Decision-Making               | 60% use ICTs to access new                          |           |
|              |   | information and inform decisions                    |           |
|              | Innovation Backbone                     | N/A   |           |
| Equality     | Competency Gap Reduction                | 66% consider ICTs enable                            | 38%       |
|              | Induciveness                            | opportunities for vulnerable people                 | -         |
|              | Inclusiveness                           | community belonging                                 |           |
|              | Openness and Accountability             | N/A   | 1         |

**Table 8**. Summary of quantitative data on ICTs and resilience

A quick overview benchmark of the extent to which ICTs are contributing to resilience in the community can be obtained by plotting the aggregate attribute data and the individual marker data, as shown in Figures 47 and 48. Figure 47 includes some potential icons that can be used to summarise each of the attributes.



Figure 47. Contribution of ICTs to resilience attributes



Figure 48. Contribution of ICTs to resilience markers

The large amount of white space on each of the diagrams provides a general indication that, as yet, ICTs are making only a quite limited contribution to community resilience in Barrio Luján; very significantly under-shooting on their potential.<sup>11</sup> (This would also provide a useful basis for comparison between communities if RABIT were applied in multiple locations.)

What should be the priorities for future ICT-related actions in the community, seeking to enhance resilience? Table 8 and Figures 47 and 48 do provide a basis for understanding this: looking for those attributes and markers that score lowest. However, priorities are probably better conveyed through alternative visualisations. For example, Figure 49 provides a simple "traffic light" approach to understanding priorities:

- Resilience attributes scoring 0-33% ICT aggregate use are rated red, and are high priorities for future ICT-related intervention.
- Resilience attributes scoring 34-66% ICT aggregate use are rated yellow, and are medium priorities for future ICT-related intervention.
- Resilience attributes scoring 67-100% ICT aggregate use are rated green, and are low priorities for future ICT-related intervention.



Figure 49. "Traffic light" prioritisation of areas for action on ICTs and community resilience

 $<sup>^{11}</sup>$  Note that these presentations ignore 'n/a' data. One could make some case that such data should be recorded as 0% - data is redrawn on this basis in Annex 6; this further emphasises the gaps in ICT usage within the community.
A similar approach can be used for the individual markers, as shown in Table 9, but adding blue for those n/a' items that require further investigation. The same components are presented more visually in Figure 50.

| <b>Action Priority</b>   | Community Resilience Marker  |
|--------------------------|--|
| High                     | <ol> <li>Inclusiveness</li> <li>New and Traditional Knowledge</li> <li>Capacity Building</li> <li>Multi-Level Networks</li> <li>Collaboration and Consensus</li> <li>Rapid Resource Mobilisation</li> <li>Physical Preparedness</li> <li>Resource Spareness</li> <li>Local Leadership and Trust</li> </ol> |
| Medium                   | <ol> <li>Multi-Level Governance</li> <li>Resource Substitutability</li> <li>Cross-Level Interactions</li> <li>Institutional Capacity</li> <li>Adaptable Decision-Making</li> <li>Competency Gap Reduction</li> </ol>   |
| Low                      | 16. Rapid Resource Access<br>17. Different Actions/Opportunities<br>18. Social Networks  |
| Further<br>Investigation | <ul> <li>a. Reflective Thinking</li> <li>b. Functional Overlaps and Interdependency</li> <li>c. Rapid Resource Assessment/Coordination</li> <li>d. Resource Access and Partnerships</li> <li>e. Innovation Backbone</li> <li>f. Openness and Accountability</li> </ul>                                     |

**Table 9**. Priority e-resilience markers for future action



The data visualised above prioritises solely on the basis of current levels of ICT usage in the community. But we can also use the earlier data that benchmarked community resilience attributes. There does not appear to be any particular relationship between these two measures. It could have been possible, for example, that aspects of resilience with lower levels of ICT usage were rated weaker by community members. However, correlating the data by rank produces results close to zero.

We can create a composite e-resilience priority index, combining the ICT gap measure (100current ICT usage levels) with the summative measure of overall strength/weakness shown in Figure 10.<sup>12</sup> The result is shown in Table 10. This is dubious because the data are "apples and oranges": the gap measure is a percentage figure bounded between 0 and 100; the strength/weakness sum measure could in theory take any value. It only works because the sum measures are within a reasonable range in this particular case.<sup>13</sup>

| Resilience<br>Attribute    | Composite e-<br>Readiness<br>Priority Index | Priority    |
|----------------------------|---|-------------|
| Robustness                 | 105   | First-Tier  |
| Learning                   | 99  |             |
| Scale                      | 76  | Second-Tier |
| Equality                   | 75  |             |
| Redundancy                 | 54  | Third-Tier  |
| Rapidity                   | 51  |             |
| Self-Organisation          | 42  |             |
| Diversity &<br>Flexibility | 42  |             |

Table 10. e-Resilience action priorities by composite index

Despite its questionable foundations, the results of the composite index does pass a test of reasonableness: robustness gets a high priority because, despite a middling ICT usage score, it is seen by community stakeholders as having a lot of weaknesses. Learning and diversity/flexibility have similar community benchmarks but are differentiated on the index because the former has seen very little contribution of ICT to date compared to the latter.

The results are not radically different from those shown in Figure 49's traffic light but they do take account of a wider range of evidence, and the colours are modified to acknowledge that no resilience attribute deserves a green light on this basis – there is either a gap in ICT potential that can be filled and/or a significant number of recognised resilience weaknesses that need to be addressed. Tables 9 and 10 can be combined to provide an overview of priorities, as shown in Table 11. For consistency, the orange category in Table 10 is merged – based on the traffic light scoring system – into the red, high-priority category.

<sup>&</sup>lt;sup>12</sup> The combination requires the summative measure to be subtracted from the ICT gap measure. Taking robustness as an example, its ICT gap score is 61%: the gap between maximum potential use (100%) and actual current levels (39%). Its overall community strength/weakness was -44. Subtracting -44 from 61 produces a figure of 105.
<sup>13</sup> An alternative would be to combine the ranks of each item on the two measures, but that suffers from not taking into account relative differences e.g. that ICT usage in learning is so much lower than for other resilience attributes, or that robustness is rated so much weaker than other attributes.

| Attribute Priority                 | Marker Priority                         |
|------------------------------------|---|
| Robustness                         | Physical Preparedness                   |
|                                    | Institutional Capacity                  |
|                                    | Multi-Level Governance                  |
| Learning                           | Capacity Building                       |
|                                    | New and Traditional Knowledge           |
|                                    | Reflective Thinking                     |
| Scale                              | Multi-Level Networks                    |
|                                    | Resource Access and Partnerships        |
|                                    | Cross-Level Interactions                |
| Equality                           | Competency Gap Reduction                |
|                                    | Inclusiveness                           |
|                                    | Openness and Accountability             |
| Redundancy                         | Resource Spareness                      |
|                                    | Functional Overlaps and Interdependency |
|                                    | Resource Substitutability               |
| Rapidity                           | Rapid Resource Access                   |
|                                    | Rapid Resource Assessment/Coordination  |
|                                    | Rapid Resource Mobilisation             |
| Self-Organisation                  | Collaboration and Consensus             |
|                                    | Social Networks                         |
|                                    | Local Leadership and Trust              |
| <b>Diversity &amp; Flexibility</b> | Different Actions/Opportunities         |
|                                    | Adaptable Decision-Making               |
|                                    | Innovation Backbone                     |

Table 11. e-Resilience attribute and marker priorities for action

However, each of the data visualisations given so far is a strong simplification that presents only parts of the overall picture. A richer overview can be provided through the "Resilience Wheel" summary shown in Figure 51. It uses a modified version of the traffic light system with a red ranking (level 0: effectively no ICT usage) only to be applied if ICT usage is less than 10% for a particular indicator. The remainder of the usage levels are divided evenly into orange (level 1: some ICT usage), yellow (level 2: ICTs mostly used) and green (level 3: ICTs highly used).

The Resilience Wheel is able to incorporate all the attributes and markers, the nature of the survey data, as well as overview ratings for both markers and overall attributes. It therefore brings together in one place a number of the visualisations provided earlier. As noted above, pilot survey constraints mean the quantitative data presented here has its limitations. But the resilience wheel – like the other visualisations here – is an attempt to provide practitioners and decision makers with a practical tool that can be easily implemented and understood, and that provides an overall 'snapshot' of ICTs' contribution to resilience-building at the local level.

The wheel visualises the linkages between ICTs and resilience attributes clearly and holistically, thus helping to evaluate current initiatives or to inform the design of future actions on resilience and climate change in Barrio Luján. It also facilitates the identification of resilience markers for which no data is available and, therefore, where further research is needs to be conducted.



Figure 51. Resilience wheel for Barrio Luján

# Section 4. Recommendations: Strengthening Barrio Luján's Resilience

## 4.1. Priority Actions on Resilience

The analysis and visualisation of data on community resilience benchmarking shown in subsection 2.3 suggested three tiers of priorities for future action, based around the current state of the different resilience attributes. As shown in Table 12, the first two tiers alone will provide a detailed and extensive agenda for action. 'Level of involvement' indicates which of community-level, municipality-level and national-level stakeholders would be involved.

| Resilience   | Resilience           | Potential   | Level of    |   |      |
|--|----------------------|---|-------------|---|------|
| Attribute  | Marker               | Intervention  | Involvement |   | nent |
|  |                      |   | C           | M | N    |
| Robustness   | Physical             | Community campaign to clear and     maintain river area prove to flooding | Х           |   |      |
|  | Institutional        | Develve coedcorp funding to   | V           | V |      |
|  | Capacity             | Devolve Seeacon funding to     community Pick and Disaster                | ^           | Λ |      |
|  | Capacity             | Prevention Group  |             |   |      |
|  | Multi-Loval          | <ul> <li>Municipal authorities (government)</li> </ul>                    | X           | Y | -    |
|  | Governance and       | fire police) to hold participatory  | ~           | Λ |      |
|  | Networking           | workshop for community youth on   |             |   |      |
|  | neemonning           | community development including   |             |   |      |
|  |                      | emergency prevention and response   |             |   |      |
| Learning   | Capacity Building    | Undertake a community mapping   | Х           | Х |      |
|  | New and Traditional  | exercise to identify emergency-   |             |   |      |
|  | Knowledge            | related stakeholders, resources,  |             |   |      |
|  | Reflective Thinking  | risks, and to plan emergency actions                                      |             |   |      |
|  | -                    | <ul> <li>Seek funding for training</li> </ul>                             |             |   |      |
|  |                      | programmes for community  |             |   |      |
| organisation me                                      |                      | organisation members  |             |   |      |
|  |                      | <ul> <li>Build community of practice around</li> </ul>                    |             |   |      |
|  |                      | local development actions   |             |   |      |
| Scale  | Multi-Level          | Ensure emergency action plan has  | Х           | Х |      |
|  | Networks             | identified individual contact points                                      |             |   |      |
|  |                      | within community and in local   |             |   |      |
| Resource Access Access Seek sponsorship for a "Green |                      | V   |             | V |      |
| and Partnerships                                     |                      | ^   |             | ^ |      |
|  | Cross-Level          | Develop an occasional programme of  | X           | X | X    |
|  | Interactions         | either presentations to community   | ~           | Λ | ~    |
|  |                      | organisations from municipal/national                                     |             |   |      |
|  |                      | actors; or visits for community   |             |   |      |
|  |                      | organisation representatives to   |             |   |      |
|  |                      | municipal and national organisations                                      |             |   |      |
|  |                      | <ul> <li>Negotiate with municipality and</li> </ul>                       |             |   |      |
|  |                      | Ministry of Public Works for  |             |   |      |
|  |                      | investment in improved water and  |             |   |      |
|  |                      | sewerage management   |             |   |      |
| Diversity  | Different Courses of | Create cross-community network to   | Х           |   |      |
|  | Action/Emerging      | share ideas about climate-related   |             |   |      |
|  | Opportunities        | initiatives   |             |   |      |
|  | Adaptable Decision-  | <ul> <li>Encourage broader range of activities</li> </ul>                 |             |   |      |
|  | Making               | among Barrio Lujan's Entrepreneurial                                      |             |   |      |

| Resilience Resilience<br>Attribute Marker |                                | PotentialLevel ofInterventionInvolvemonCM  |   |   |  |
|---|--------------------------------|--|---|---|--|
|   | Innovation<br>Backbone         | <ul> <li>Women's group</li> <li>Incorporate competition for best<br/>innovative idea as part of "Green<br/>Barrio" initiative</li> </ul>   |   |   |  |
| Equality                                  | Competency Gap<br>Reduction    | <ul> <li>Targeted training activities towards<br/>more-marginalised groups including<br/>senior and unemployed community<br/>members</li> </ul>  | X | Х |  |
|   | Inclusiveness                  | <ul> <li>Review membership of community<br/>organisations to ensure some<br/>incorporation of more marginalised<br/>groups</li> </ul>  | X |   |  |
|   | Openness and<br>Accountability | <ul> <li>Ensure general availability of<br/>information such as contacts,<br/>actions, etc of community<br/>organisations, including a 'welcome<br/>pack' for new residents</li> </ul> | X | X |  |

Table 12. Priority actions to improve community resilience in Barrio Luján

## 4.2. Priority Actions on e-Resilience

We can similarly use the analysis and visualisation of data shown in sub-section 3.3, which benchmarks ICTs and resilience in the community. Any of the visualisations could have been used as the basis for prioritising future ICT-related interventions. However, here we make use of Table 11, itself an amalgamation of Tables 9 and 10.

Following prioritisation principles, only markers in the 'High' and 'Medium' tiers of Table 9 are highlighted for future action since this already provides a substantial agenda for action. The results are shown in Table 13 and, as in the previous sub-section, 'Level of involvement' indicates which of community-level, municipality-level and national-level stakeholders would be involved.

Priority actions reflected in Table 13 include the suggestions gathered from the participants that attended the RABIT learning event held in San Jose, Costa Rica, in August 2014 (further information about the event is available in Annex 7).

| Resilience Resilience   |   | Potential e-Resilience Intervention   |                  |             | of                    |
|---|---|---|------------------|-------------|-----------------------|
| Attribute<br>Priority   | Marker Priority   |   | C                | M           | nent<br>N             |
| Robustness  | Physical<br>Preparedness<br>Institutional<br>Capacity                                 | <ul> <li>Provide to the community well-visualised overviews of climate change impacts, and priorities for adaptive actions</li> <li>Make greater use of geographic information systems to map climate change, and to plan development of physical defence infrastructure</li> <li>Provide training to Risk and Disaster Prevention Group on uses of ICT in risk identification and</li> </ul>   | x                | X<br>X      | X<br>X<br>X           |
|   | Multi-Level<br>Governance   | <ul> <li>emergency response</li> <li>Utilise ICTs to support community youth training and engagement workshops on community development</li> <li>Ensure National Network of Community Resilience (UNESCO-led, local coordination by San José Municipality) incorporates ICTs into future plans and proposals</li> <li>Work with San José Municipality and National Emergency Commission to ensure effective use of ICTs in communications with local communities</li> </ul>   | X                | x<br>x<br>x | x<br>x                |
| Learning       Capacity Building         New and<br>Traditional<br>Knowledge       • As part of 'Green Barrio' activity, produce awareness-raising and information campaign of<br>environmental issues and impacts (including climate change) in local community         • Develop interactive e-learning course on climate change, community impact, and adaptiv<br>practices         • Develop broader interactive e-learning course on community environmental issues and ac<br>(e.g. garbage disposal, pollution, housing)         • Use ICTs to help record, visualise and share the community mapping exercise         • Use ICTs to develop and support the community of practice on local development actions |   | <ul> <li>As part of 'Green Barrio' activity, produce awareness-raising and information campaign on environmental issues and impacts (including climate change) in local community</li> <li>Develop interactive e-learning course on climate change, community impact, and adaptive practices</li> <li>Develop broader interactive e-learning course on community environmental issues and actions (e.g. garbage disposal, pollution, housing)</li> <li>Use ICTs to help record, visualise and share the community mapping exercise</li> <li>Use ICTs to develop and support the community of practice on local development actions</li> </ul>   | ×<br>×<br>×<br>× | ××          | X<br>X<br>X<br>X<br>X |
| Scale   | Reflective Thinking<br>Multi-Level<br>Networks<br>Resource Access<br>and Partnerships | <ul> <li>N/A</li> <li>Post an updateable (e.g. as wiki) list of relevant community, municipality and national institutions of relevance to environmental and community development: their contacts and responsibilities and resources</li> <li>N/A</li> </ul>   | X                |             |                       |
| Equality  | Cross-Level<br>Interactions<br>Competency Gap<br>Reduction<br>Inclusiveness           | <ul> <li>Use IC is to support interactions e.g. cross-community and cross-level community of practice to exchange resources, adaptive practice ideas, case examples, lessons learned, events, etc</li> <li>Develop specific ICT training for more marginalised members of the community including seniors, women and unemployed</li> <li>Investigate development of local youth as 'environmental knowledge brokers', using ICTs to access environmental information, to train others, to create environmental awareness within the community, to capture and share traditional knowledge of seniors, to participate in broader networks</li> <li>Create a Barrio Luján community Facebook page to foster community identity</li> </ul> | ×<br>×<br>×<br>× | X           |                       |
|   | Openness and Accountability   | N/A   |                  |             |                       |

| Resilience Resilience<br>Attribute Marker Priorit<br>Priority |  | Potential e-Resilience Intervention  |        |   | of<br>nent<br><i>N</i> |
|---|--|--|--------|---|------------------------|
| Redundancy  | Resource<br>Spareness                          | <ul> <li>Run a basic e-entrepreneurship training programme to show current and potential entrepreneurs<br/>within the community how to use ICTs to increase income</li> </ul>  | Х      |   | X                      |
|   | Functional<br>Overlaps and<br>Interdependency  | N/A  |        |   |                        |
|   | Resource<br>Substitutability                   | <ul> <li>See `multi-level networks' idea about online list of resource-providing institutions; ensure<br/>inclusion of volunteer resources</li> </ul>  | Х      |   |                        |
| Rapidity  | Rapid Resource<br>Access                       | N/A  |        |   |                        |
|   | Rapid Resource<br>Assessment /<br>Coordination | N/A  |        |   |                        |
|   | Rapid Resource<br>Mobilisation                 | <ul> <li>Develop an effective early warning system e.g. via SMS to key community members</li> </ul>  | Х      | Х |                        |
| Self-<br>Organisation   | Collaboration and<br>Consensus                 | <ul> <li>Design e-deliberation applications to allow online, considered participation in development of<br/>community plans</li> </ul>   | X      |   | X                      |
|   | Social Networks                                | <ul> <li>Develop an SMS/email/social media alert list to share community activities and projects<br/>N/A</li> </ul>  | X      |   |                        |
|   | Local Leadership<br>and Trust                  | <ul> <li>Train local community leaders in use of ICTs for community organising</li> <li>Use ICTs to specifically create local 'Green Champions' who could run the 'Green Barrio' initiative, and be trained around climate change and other environmental issues, develop plans with the community through social media, coordinate campaigns and actions with municipal and national stakeholders, and disseminate information to the community via social media</li> </ul> | X<br>X | Х | X<br>X                 |
| Diversity & Different Actions /                               |  | N/A  |        |   |                        |
|   | Adaptable<br>Decision-Making                   | <ul> <li>Actions above on new access to environmental information, sharing of ideas, knowledge<br/>brokering, etc should provide new information to enable new decisions</li> </ul>  | Х      | Х | Х                      |
| Innovation N/A<br>Backbone                                    |  |  |        |   |                        |

 Table 13. Priority actions to improve community e-resilience in Barrio Luján

## **ANNEX 1: RABIT Survey, Costa Rica Pilot**

### **RABIT SURVEY, Barrio Luján ICTs and Climate Change Resilience**

This survey is part of a collaborative project between the Cooperative Sulá Batsú, the University of Manchester, and the Emergency Committee of Barrio Luján. We would like to know your opinion about the use of new technologies (Internet and mobile phones), and how these technologies could contribute to strengthen local responses and community activities. The results of this survey will be shared with the community once the analysis has been completed.

| 1 Condor                      | 2 Ago rongo       |                          | 2 Occupation                     |                     |
|-------------------------------|-------------------|--------------------------|----------------------------------|---------------------|
| A Female                      |                   | ars old                  | A Student                        | e of                |
| A. Fellidle                   | A. 10 to 25 yea   |                          | A. Student                       | iics<br>ewe         |
| B. Male                       | B. 20 10 35 ye    |                          | B. Employed                      | T I:<br>rist<br>vie |
|                               | C. 36 to 45 ye    | ars old                  |                                  | AR<br>cte<br>itei   |
|                               | D. More than 4    | 46                       | D. Own business                  | ara.<br>e Ir        |
|                               |                   |                          | E. House wife                    | t C                 |
|                               |                   |                          | F. Unemployed                    |                     |
| 4. Do you own a mobile phone? | 4.1 If YES, hov   | v many mobile            | phones do you own?               |                     |
| A. Yes                        |                   |                          |                                  | _                   |
| B. No                         | 4.2. If NO, wh    | y not?                   |                                  |                     |
| 4.3 What do you use the mobi  | ile phone for?    | 4.4 In your o            | pinion, what are the main        |                     |
| A. Make and receive calls     |                   | benefits of u            | sing a mobile phone?             |                     |
| B. Send/receive text message  | ges               |                          |                                  |                     |
| C. Games                      |                   |                          |                                  |                     |
| D. Internet                   |                   |                          |                                  |                     |
| E. Other                      |                   |                          |                                  |                     |
| 4.5 In your opinion, what a   | re the main disa  | dvantages or p           | roblems of using a mobile phone? | E                   |
|                               |                   |                          |                                  | ptic                |
| 5. Do you have access to a    | computer with     | 5.1 If yes, wh           | nere do you access it?           | LCe                 |
| Internet?                     |                   | A. Home                  |                                  | Бе :-               |
| A. Yes                        |                   | B. Internet C            | afé/Telecentre                   | RT I                |
| B. No                         |                   | C. Public Library        |                                  | PAI<br>ss a         |
|                               |                   | D. At family or friends' |                                  |                     |
|                               |                   | ,<br>F. Other            |                                  | : Ac                |
| 5.2. If the answer is NO, wh  | iy don't you have | a computer/t             | ablet with Internet access?      | ICTs                |
| 5.3 What do you use the In    | ternet for?       | 5.4 In your o            | pinion, what are the main        |                     |
| A.E-mail                      |                   | benefits of u            | sing the Internet?               |                     |
| B. Social networks            |                   |                          |                                  |                     |
| C. Work-related research      |                   |                          |                                  |                     |
| D School homework             |                   |                          |                                  |                     |
| E. Others                     |                   |                          |                                  |                     |
| 5.5 In your opinion, what a   | re the main disad | lvantages or p           | roblems of using the Internet?   |                     |
|                               |                   | -                        |                                  |                     |
|                               |                   |                          |                                  |                     |
| 1                             |                   |                          |                                  |                     |

|                                       | ROB               | USTNESS  |              |
|---------------------------------------|-------------------|--|--------------|
| 6. Do you access information          | about the weat    | ther in the mobile phone or the Internet?        |              |
| A. Always                             |                   |  |              |
| B. Sometimes                          |                   |  |              |
| C. Never                              |                   |  |              |
| 6.1 I use the mobile/Internet         | to access inform  | mation that helps me prepare better for          |              |
| emergencies                           |                   |  |              |
| A. Agrees                             |                   |  |              |
| B. Doesn't know / No answer           |                   |  |              |
| C. Disagrees                          |                   |  |              |
| 6.2. I use the Internet and the       | e mobile to       | 6.3 If the answer is yes, to which institutions? |              |
| report problems and emerge            | ncies to the      |  |              |
|                                       |                   |  |              |
| B. Doesn't know / No answer           |                   |  |              |
| C Disagrees                           |                   |  |              |
|                                       | SELF-OR           | GANISATION                                       |              |
| 7. The Internet and the mobil         | le have allowed   | me to participate or organise activities or      |              |
| projects in the community             |                   |  |              |
| A. Always                             |                   |  | S            |
| B. Sometimes                          |                   |  | oute         |
| C. Never                              |                   |  | ti ::        |
| 7.1 Which social networks do          | you use and fo    | r what purpose?                                  | RT I<br>e At |
| Social Network                        | Usage (           | YES/NO) YES: For what purpose?                   | PAF          |
| Facebook                              |                   |  | silie        |
| Twitter                               |                   |  | Res          |
| YouTube                               |                   |  |              |
| Instagram                             |                   |  |              |
| Other                                 |                   |  |              |
| 7.2 Technologies (ICTs) are he        | elping to build t | rust among people                                |              |
| A. Agrees                             |                   |  |              |
| B. Doesn't know / No answer           |                   |  |              |
| C. Disagrees                          |                   |  |              |
| LEARNING                              |                   |  |              |
| Internet (e.g. online courses)        | through the       | received?  |              |
| A. Agrees                             |                   |  |              |
| B. Doesn't know / No answer           |                   |  |              |
| C. Disagrees                          |                   |  |              |
| 8.2 Through the mobile phon community | e or the Interne  | et I identify ideas to make improvements in my   |              |
| A. Agrees                             |                   |  |              |
| B. Doesn't know / No answer           |                   |  |              |
| C. Disagrees                          |                   |  |              |
|                                       | REDU              | INDANCY  |              |

| 9. I use the mobile or the Internet to generat<br>(e.g. receive remittances, do business)   | te some additional money to my normal income   |  |  |
|---|--|--|--|
| A. Agrees   |  |  |  |
| B. Doesn't know / No answer   |  |  |  |
| C. Disagrees  |  |  |  |
| 9.1 I use the mobile or the Internet to access government aid, donations, family/friends)   | resources in cases of emergency (e.g.  |  |  |
| A. Agrees   |  |  |  |
| B. Doesn't know / No answer   |  |  |  |
| C. Disagrees  |  |  |  |
| RA  | PIDITY   |  |  |
| 10. Having mobile or Internet access has  | 10.1 I have access to Early Warning Systems  |  |  |
| made faster or slower accessing help in<br>cases of emergency?  | though the mobile of the Internet  |  |  |
| A. Faster   | A. Agrees  |  |  |
| B. Doesn't know / No answer   | B. Doesn't know / No answer  |  |  |
| C. Slower   | C. Disagrees   |  |  |
| S   | CALE   |  |  |
| to work with new groups or organisations<br>involved in emergency response or<br>community development  | 11.1 If yes, could you mention an example?   |  |  |
| A. Agrees   |  |  |  |
| B. Doesn't know / No answer   |  |  |  |
| C. Disagrees  |  |  |  |
| 11.2 The access to the mobile/Internet has allowed me to be in contact with representatives of institutions (e.g. Municipality, ONGs, Committees) |  |  |  |
| A. Agrees   |  |  |  |
| B. Doesn't know / No answer   |  |  |  |
| C. Disagrees  |  |  |  |
| DIVERSITY A   | ND FLEXIBILITY   |  |  |
| 12. The mobile and the Internet allow me<br>to get to know options and opportunities<br>to improve my quality of life                             | 12.1 The mobile/Internet has allowed to<br>access new knowledge and take better<br>decisions |  |  |
| A. Agrees   | A. Always  |  |  |
| B. Doesn't know / No answer   | B. Sometimes   |  |  |
| C. Disagrees  | C. Never   |  |  |
| EC  | <b>Ω</b> υιτγ  |  |  |
| 13. Mobile/Internet access helped<br>vulnerable people to access new<br>opportunities.  | 13.1 If the answer is YES, could you give an example?  |  |  |
| A. Agrees   |  |  |  |
| B. Doesn't know / No answer   |  |  |  |
| C. Disagrees  |  |  |  |

| 13.2. Mobile/Internet access has<br>strengthened or weakened my sense of<br>belonging to the community? | 13.3. If the answer is YES, could you give an example? |  |
|---|--|--|
| A. Agrees   |  |  |
| B. Doesn't know / No answer   |  |  |
| C. Disagrees  |  |  |

## ANNEX 2: RABIT Interview Guidelines, Costa Rica Pilot

Interviewees: Community members (micro-level stakeholders), Barrio Luján, Costa Rica

#### A. Local context

-What are the positive characteristics/strengths of the community?

-What are the problems faced by the community? And what are the external problems that do not originate in the community, but that affect it?

#### B. Role of climate change, impacts and local response

-In your experience, has there been any incident related to climate change that has affected the community?

-What was the response to those impacts? What did you do, why, and who helped you? -Are there any measures that have been taken to prevent or mitigate those impacts in the future?

-When those incidents took place, do you know if mobile phones or the Internet played a role in the community's response?

-What are the key challenges that community members face to use the mobile phone/Internet effectively?

#### C. Community Resilience

#### Robustness:

-In your opinion, is the community prepared to respond to disasters or climatic events/emergencies?

-Is there any physical infrastructure/physical measure that has been adopted in the community to prevent damage in case of climatic emergencies?

-Do you know of any laws, policies that help to reduce the risk of the community to climatic events?

#### Self-organisation:

-What can you tell me about the capacity of the community members to organise among themselves, in case of crisis or problems?

-Are you a member of local groups or associations? How strong are those groups?

#### Learning:

-Is it common for people/neighbours in the community to share their experiences and their knowledge with each other?

-Has any training/awareness-raising activity about climate change taken place in this community? Do you know if those issues are taught to youth at school?

#### Redundancy:

-In this community, are there several institutions/organisations that work on the same issues? (for example, multiple cooperatives, multiple NGOs)

-If you were not able to access support from family and neighbours in times of emergency, who would you go to for help?

#### Rapidity:

-Do you consider that, in case of emergency or climatic events, the community responds and acts rapidly?

-Do you consider that community members can access resources swiftly? For example, immediate support from friends/institutions/insurances, in case of need?

-Do you know of any early warning system operating in this community?

#### Scale:

-In your opinion, are members of the community in contact with institutions/organisations that are not based in this neighbourhood?

-Do you know of any examples of associations or collaborative work between the community, the private sector, NGOs and/or local/national authorities?

#### **Diversity and Flexibility:**

-Do you consider that the community adapts well to change? For example, to changes in the economic, political or environmental situation

-Do you think that the community implements innovative practices? Can you give me any examples?

#### Equality:

-Are there differences/gaps among different community groups, for example between seniors and youth, or among people with higher and lower income?

-Do you consider that the needs and opinions of all community members (including seniors, youth, women heads of households) are being heard and considered? (for example as part of community projects/initiatives, local organisations)

## **ANNEX 3: RABIT Guidelines for KETSO Focus Group Facilitators**



## Resilience Assessment Benchmarking and Impact Toolkit (RABIT): Pilot Implementation in Costa Rica

Dr. Angelica V Ospina. The University of Manchester, Centre for Development Informatics (CDI) <u>http://www.cdi.manchester.ac.uk/newsandevents/</u>

This workshop has three main objectives:

- Foster buy-in and appropriation of the toolkit by Sula Batsu staff (local project partners)
- Gather feedback on potential adjustments of the toolkit based on its main components (aim, data collection, stakeholder engagement, analysis and presentation of data).
- Identify collectively ways of implementation of the pilot that respond to the partners' expectations, and obtain maximum benefits.

It includes the following issues to be discussed by the group (in the form of <u>branches</u> on Ketso felt):

- Links between Resilience and ICTs
- Data Collection
- Stakeholder Engagement (Key stakeholder )
- Analysis and Presentation of Data
- Impact (in the community)
- **Blank** for ideas that emerge from discussion / cross cutting ideas

| Ove | Overview Workshop Plan - (2 Hours)                        |                        |                             |          |  |  |  |
|-----|---|------------------------|-----------------------------|----------|--|--|--|
|     | Stage of Workshop   | Adjustment             | Ketso tool                  | Duration |  |  |  |
| 1   | Introductions, Clarifications +Warm-up                    |                        | Yellow                      | 15       |  |  |  |
| 2   | What works well when working with<br>communities?         | Time can<br>be reduced | Brown                       | 15       |  |  |  |
| 3   | Future possibilities – what would you like to see and do? |                        | Green                       | 15       |  |  |  |
| 4   | Linkages with resilience characteristics                  |                        | Blank cards + !             | 10       |  |  |  |
|     | Coffee Break  |                        |                             | 15       |  |  |  |
| 5   | Challenges  |                        | Grey                        | 15       |  |  |  |
| 6   | Solutions to challenges                                   |                        | Green                       | 15       |  |  |  |
| 7   | Identifying priorities                                    |                        | $\checkmark$                | 5        |  |  |  |
| 8   | Goals   |                        | Yellow                      | 15       |  |  |  |
| 9   | Identifying key messages and priorities                   | Time can<br>be reduced |                             | 10       |  |  |  |
| 10  | Summing up  |                        | ! + Personal<br>Action Card | 10       |  |  |  |

\*Workshop plan based on sample prepared by Ketso, GRAMNet and Renfrewshire Council, and input from Dr. Joanne Tippett. For more information about Ketso, see <a href="https://www.ketso.com">www.ketso.com</a>

#### **1** Introduction, Clarifications and Warm-up Exercise

15 minutes

5 minutes

Yellow

• Brief words about Ketso (using SLIDES)

#### Warm-up exercise

- In your opinion, why is resilience important for the community? (**Prompt:** based on what was discussed during the morning's presentation)
- Participants work individually, then share one ideas at a time.
- Ideas are placed in the Ketso planner (Small grid), and kept as a reference for other discussions (including timeline/milestones using the Ketso grid).
- Suggest that if ideas are similar, participants place leaves close to each other, if they are different, they place them further apart.

#### **Objectives of the workshop**

- Team engagement/appropriation of the project
- Pilot adjustment
- Ways of implementation to respond to expectations and obtain maximum benefits
- Anything to add?

#### Background Ketso

- It's a hands-on kit for creative groupwork, and we will be using this kit today to capture and share our ideas.
- Ketso means action in Lesotho, Southern Africa, where it was invented (Slides).
- It's really easy to use. Examples (slides)
- Social business (slides)

#### How to use it? Instructions and Clarifications

- There are **different coloured leaves** for different kinds of ideas which we'll explain as we go along write on coloured side of the leaf.
- Write or draw one idea per leaf.
- Use the **special pens** provided so the leaves can be cleaned and re-used.
- Ketso is about working together and having good discussions, but it's more than that. It is also about giving everyone an opportunity to think for themselves and come up with their own ideas. So we will alternate between individual thinking time and group discussion. We call this **'think then share'**. It really helps to keep everyone involved and to get more creative thinking going than a simple discussion would.

#### Workshop process overview

- We are going to look at what do we know that works when working with communities.
- Then we will consider creative options for the future.
- Then we will think of the challenges and problems we are facing.
- Then we will think of ways of overcoming the challenges.
- We will be prioritising ideas later, so for the moment, please get all the ideas on the table without trying to judge them.
- Each stage will take about 15 minutes. I will be using **a bell** for timekeeping. The first ring will be asking groups to wrap up and finish off what they are doing and the second ring will ask all the participants to stop what they are doing and listen to next instructions.

- Each time we go on to a new stage, you will be spending a few minutes to write ideas down on your own, then after that time, you will share them with your group. Having this time on your own to develop ideas allows everyone some time to think and put forward ideas that may not be obvious or come out if the group starts by discussing ideas first.
- At any point, if you have a thought, grab a leaf and capture it so we can share it later.

#### What will happen to the outcomes?

- Photos to be taken of all the workspaces so please **write or draw clearly** so we can see what the idea was.
- These will be then transformed into a report which will be circulated to participants.
- Key messages will be considered in the next steps of the pilot's implementation.

#### 2 First Stage: What works well when doing projects with communities? 15 minutes

Brown

15 minutes

Green

- Ketso is on the table, pre-prepared with branches and *folded over* (centrepiece needs to be moved so they fold).
- Write or draw one idea per leaf, use the pens provided.
- We have different colour leaves for the different stages of the workshop. We'll start with **brown leaves. This is the soil we have to grow our ideas in.** Write on the coloured side.
- Ask the question and ask participants to write their own ideas, *without sharing at first*, onto the brown leaves.
- Open felt after participants have had brief time to write some ideas on their own.
- After opening the felt, briefly describe the different branches and explain that the **blank branch** is used for cross cutting themes which will emerge as a result of the discussion where all those ideas which don't fall under those specified can be placed.
- Read out and put down 1 leaf at a time, going around the table to share your ideas and give everyone a turn.
- Point the leaves at appropriate branches where they seem to fit. If similar ideas come up, point the leaves at each other to create a cluster. You can move the leaves around and discuss what the branches mean.
- If there's still time, encourage people to add more ideas to the felt, going around the tables and encouraging participants to write and add more ideas perhaps pointing out branches that don't have much on them and suggesting that participants can use the branches to see if they can think of more ideas in that area.
- Towards the end of this session put green leaves on the table for the group to use in the next stage.

#### **3 Next Stage: Future Possibilities**

- Using **green leaves**, come up with some ideas and possibilities for the future, what would you like to see (this is like the shoots of new ideas that grow in the brown soil of what we already have (VALUE OF RESILIENCE FOR THE COMMUNITY & WHAT WORKS WELL WITH COMMUNITIES).
- Be as creative and open as possible, no right or wrong answers at this stage.
- Again, start with time on own to develop ideas, then share them with the group and place on the workspace where they seem to fit best. (Think then Share)

## 4 Can we link the ideas that we have shared so far, with the characteristics of resilient communities? 10 minutes



- Moderator places on the table the pre-prepared white comment cards with the name of the resilience characteristics (one characteristic per card).
- Ask participants to place the characteristics next to the ideas identified before. Link similar ideas with white icons.
- **PROMPT:** Role of ICTs towards resilience, as discussed during the morning presentation



• Ask participants to indicate what are the most important of those resilience characteristics for the community (go around the table)



- We'll now use Grey leafs: is the grey rain clouds hiding the sun and getting in the way of what we want to achieve.
- Using 2 leafs per each participant, consider what are the problems or challenges that could we face in the pilot's implementation, and what are the key barriers to achieving the ideas being developed here?
- Take a few minutes on your own, to develop the ideas, and in a few moments you can share ideas.
- You can come up with barriers to some of the specific new ideas you have developed on green leaves or those developed by other participants.
- Towards the end of this session put green leaves on the table for the group to use in the next stage.
- If the linkages between ICTs and resilience are all positive, ask participants to use GREY leafs to identify potential negative impacts of ICTs on resilience, or challenges to their role.

15 minutes

Green

#### 6 Solutions to challenges



- This exercise is to get you to think creatively of ways to overcome some of the challenges you have been discussing.
- Take a few **green leaves** and see if you can develop ideas for solutions to the problems identified in the previous stage.
- Encourage people to take some time on their own to develop the solutions before sharing them.

- There may be ideas on brown leaves (what is working) as well already on the felt, that could be solutions to the challenges, you can move these ideas to point at the grey leaves to show that they could help solve the problems.
- Make sure to clearly point the solution at the grey leaf problem that it refers to.

#### 7 **Identifying Priorities**

- This is a stage of filtering ideas, to help everyone see what is important on the felt. It aids in developing goals.
- Ask each person to take 1 tick icon from the icon pad.
- Without discussing the ideas in the group, place your icon next to those leafs that that strike you personally as particularly important for the success of the pilot. The way to think if this could be - if we removed every leaf apart from one on this felt, which would be the one that you think is the most important to leave behind for us to consider?

#### 8 Next Stage: Goals

- Coming close to the end of the exercise
- We are now going to use yellow leafs, the bright sunshine that drives growth and keeps everything going.
- Take a few **yellow leaves** and look at the ideas on the felt.
- What are the goals that you would like to achieve for this project?
- Use the icons as a guide to see what you think are the most important ideas do these suggest any goals?
- You may want to reword some of the ideas on green leaves to become more like goals, specific things you could aim to achieve.
- You may also want to add/reword some of the benefits of resilience from the warm up exercise, it is worth having a look at the Ketso planner to see if there are any ideas that make sense as goals (in which case you can move them onto the main felt in the appropriate place), or which suggests goals for this project (in which you can rewrite them into goals)

#### 9 Next Stage: Identifying key messages & Priorities

- Discuss the priorities, using the icons and the yellow goals as a guide to what is most important. As a group, decide the top 3 priorities. If you feel that your thinking about the priorities has changed, you can move the yellow ticks around to show the current top ideas for you.
- When you have decided on 3 priorities, write each out in large writing on an **oval** shape provided by the facilitator that will be used to put these ideas onto the mini action grid.
- Key messages will be used to bring your ideas into the planning and development process (\*as an input to the planning exercise with the Ketso felt grid to be done the next day, in order to discuss the project timeline and next steps)



5 minutes







#### 10 Summing up



• Ask participants to place a red exclamation sign on the leafs/branch that is most exciting for them/from which they expect to learn the most (\*this can help to understand expectations and motivations of the project staff).



- **PERSONAL ACTION CARD:** These ideas could be on the felt already, or they may be something you think of now. You can keep these cards to remind yourself of your next step.
- Facilitator says a few words of thanks and reminds the participants what will happen to the ideas.
- Not only key messages but all the data will be typed up and be developed into a report which will be used as input to RABIT
- Any questions?
- Thank you!

## ANNEX 4: Focus Group Findings, Sulá Batsú Staff

#### Objectives

The first focus group session of RABIT took place with Sulá Batsú staff and was aimed at fostering stakeholder engagement in the project through three main objectives:

- (a) strengthening the buy-in and appropriation of the RABIT toolkit by Sulá Batsú staff,
- (b) gathering feedback on potential adjustments to the main components of the toolkit (aim, data collection, engagement of local stakeholders, analysis and presentation of data, impact),
- (c) identifying ways of implementing pilot use of RABIT that would respond to the partners' expectations, and obtain maximum benefits.



The focus group took place in the offices of Sulá Batsú in San José (Costa Rica), with the participation of ten members of the Cooperative.

#### Structure

• The session started with a general explanation about Ketso's methodology, followed by a 'warm-up' exercise through which participants got familiar with the Ketso kit by sharing their views on why is resilience a relevant notion for developing country communities. Ideas related to the community's ability to adapt, survive, self-organise change and transform were mentioned in this regard. Related attributes such as empowerment, confidence and strength also emerged.



Ketso 'warm-up' exercise and visualisation of results (word cloud): Why is resilience important for a community?

The main discussion was structured around five areas that were key for the implementation of the RABIT project in Costa Rica:

- (a) Links between resilience and information and communication technologies (ICTs),
- (b) Data collection,
- (c) Key stakeholder engagement,
- (d) Analysis and presentation of data, and
- (e) Expected impacts in the community.

During the first round of exchange participants proposed a new theme ('Working with the community'), as illustrated below.



Ketso Workshop Plan (summary sheet) and Final Results

The results of the session are summarised in Box 1.

#### Box 1. Summary Results: Focus Group with Sulá Batsú

- The results of the session highlighted the importance attributed by local partners to working in close collaboration with community stakeholders, which was linked by participants to the need to strengthen three key attributes of the community's resilience: equality, self-organisation, and flexibility.
- 'Working with the community' was the theme with the highest number of issues related to the questions of 'what works well', which is consistent with the institutional mission and the expertise of Sulá Batsú staff.
- The theme where with highest number of opportunities identified was "Impact", suggesting that this is an area where the project team envisioned RABIT's contribution, and where most of their expectations focused on. "Impact" was also the area where most of the linkages with resilience were identified. Participants suggested that RABIT could have an impact on the rapidity, learning, self-organisation, scale, diversity and robustness of the community, ultimately helping strengthen its resilience.
- The area with the fewest number of issues identified was 'Data collection'. This was consistent with the fact that the focus group session took place at an early stage of the pilot's implementation, when challenges related to the data collection process had not yet been encountered.
- In addition to strengthening the relation between RABIT project partners and generating new spaces for knowledge exchange, the session helped build the capacity of Sulá Batsú staff with a new tool for participatory engagement<sup>14</sup>.

Overall, the use of Ketso was extremely useful to strengthen the appropriation of the toolkit by the local partner organisation, and to gather feedback on how to implement the next steps of the project in the local context. Because of its participatory nature, Ketso also helped to gain a solid understanding of the views and expectations of each of the stakeholders involved in RABIT's implementation.

<sup>&</sup>lt;sup>14</sup> As a result of this experience, Sulá Batsú acquired a Ketso kit (the first one in Costa Rica), and is using it actively as part of local community workshops and other activities. It is expected that use of the kit will help to foster its adoption among Latin American organisations, and help to build a knowledge base of Ketso resources for Spanish-speaking audiences.

## **ANNEX 5: Summary Interview Findings- Discourse Analysis**

| COMMUNITY<br>STRENGTHS   | RESILIENCE<br>ATTRIBUTES | COMMUNITY<br>WEAKNESSES   |
|--|--------------------------|---|
| <ul> <li>Presence of multiple institutions (9)</li> <li>Institutions trained for emergency response (9)</li> <li>Geographic location/accessibility to services (6)</li> <li>Access to communal room in case of emergencies/evacuation (4)</li> <li>Community prepared to respond to emergencies (3)</li> <li>Government support (2)</li> <li>Security (2)</li> <li>Adaptation measures for floods (1)</li> </ul> | ROBUSTNESS               | <ul> <li>Lack of emergency preparedness<br/>(12)</li> <li>Lack of waste<br/>management/recycling,<br/>contamination of river basin (12)</li> <li>Lack of physical infrastructure (10)</li> <li>Insecurity (10)</li> <li>Lack of policies/laws to reduce risk<br/>(8)</li> <li>Drug problems (8)</li> <li>Old infrastructure (6)</li> <li>Lack of culture of prevention (6)</li> <li>Closure of Dos Pinos factory (5)</li> <li>Increase in 'cuarterias' (2)</li> <li>Lack of implementation of laws (1)</li> </ul> |
| <ul> <li>Community organisation (11)</li> <li>Organisation around security issues (8)</li> <li>Sense of belonging/long-term in the community (7)</li> <li>Unity among neighbours (5)</li> </ul>  | SELF-<br>ORGANISATION    | <ul> <li>Lack of capacity/training to self-organise (10)</li> <li>Lack of capacity to self-organise in emergency situations (5)</li> <li>Lack of visible community leaders (2)</li> <li>Changing neighbourhoods' composition (2)</li> <li>Political interests (2)</li> </ul>  |
| <ul> <li>Local training (3)</li> <li>Seniors sharing experiences (1)</li> </ul>  | LEARNING                 | <ul> <li>Lack of training on climate change<br/>(10)</li> <li>Lack of lessons' sharing (7)</li> <li>Distrust for information sharing (2)</li> </ul>   |
| <ul> <li>Access to different sources of support<br/>in emergency situation (13)</li> <li>Availability of diverse local services<br/>(2)</li> </ul>   | REDUNDANCY               | <ul> <li>Lack of institutions working on<br/>climate change at local level (6)</li> <li>Loss of redundancy due to closure<br/>of Dos Pinos factory (2)</li> </ul>   |
| <ul> <li>Rapid response to emergency (4)</li> <li>Rapid access to resources (4)</li> <li>Early Warning Systems (2)</li> <li>Rapid resource mobilisation from municipality/IMAS (1)</li> </ul>  | RAPIDITY                 | <ul> <li>Lack of EWS (9)</li> <li>Lack of rapid information access<br/>for decision making (1)</li> </ul>   |
| <ul> <li>Collaboration between the Risk and<br/>Disaster Prevention Group, the<br/>municipality, the Fire department,<br/>IMAS (9)</li> <li>Collaboration between communities<br/>(2)</li> </ul>   | SCALE                    | <ul> <li>Lack of<br/>collaboration/communication<br/>between local and meso levels (15)</li> <li>Lack of collaboration between<br/>sectors (5)</li> <li>Limited communication between<br/>community and local institutions<br/>(2)</li> </ul>   |
|  | DIVERSITY                | <ul> <li>Lack of innovation (10)</li> <li>Lack of diversity of representatives<br/>in local groups (mainly seniors,<br/>women, lack of youth) (6)</li> </ul>  |
| Community adapts to change (7)   | FLEXIBILITY              | <ul> <li>Lack of adaptation to change (4)</li> <li>Lack of flexibility to relocate from risk areas (1)</li> </ul>   |
| <ul> <li>Activities that include seniors, youth, vulnerable groups (4)</li> <li>Equality (2)</li> <li>Community 'Junta' democratically elected (2)</li> </ul>  | EQUALITY                 | <ul> <li>Lack of participation/openness in<br/>local groups (11)</li> <li>Inequality (4)</li> <li>Poverty and homelessness (3)</li> <li>Lack of inclusion seniors/youth (2)</li> <li>Unemployment (1)</li> </ul>  |

## **ANNEX 6: Additional Data Visualisations**

Figures 52 and 53 benchmark use of ICTs to support, respectively, the attributes and markers of community resilience, but counting 'n/a' data as 0% usage rate rather than ignoring it, as in the main text.







Figure 53. Contribution of ICTs to resilience markers

Figure 54 shows an alternative to the 'traffic light' approach to visualising priorities for ICT-based interventions.



Figure 54. Prioritisation of areas for action on ICTs and community resilience

Figure 55 shows the same but as a 'sun'.



Figure 55. Prioritisation of areas for action on ICTs and community resilience

## **ANNEX 7: Final RABIT Event**

The workshop "Strengthening the Resilience to Climate Change of Barrio Luján with the Support of Information and Communication Technologies (ICTs)" was held on the 23<sup>rd</sup> of August in the communal room of Barrio Luján. The workshop constituted the closing event of the RABIT pilot project implemented jointly by the cooperative Sula Batsú and the University of Manchester in Costa Rica.

The workshop was attended by the members of the local Risk and Disaster Prevention Group of Barrio Luján. It sought to:

a) raise local awareness on the concepts of climate change, ICTs and resilience, and the attributes of resilient communities,

b) present and discuss the findings of the RABIT pilot implemented in Barrio Luján, explaining the results related to the community's resilience benchmarking, and

c) discuss recommendations for use of ICTs to improve the community's resilience to climate change, and identify future areas of work.

As a follow-up of the final event, the cooperative Sula Batsú organised a series of workshops with community members aimed at strengthening local awareness and skills on the use of ICT applications (e.g. Whatsapp, SMS and Facebook), to foster a community-based early warning network, and to raise awareness on local challenges (e.g. garbage disposal). These series of workshops sought particularly to strengthen the resilience attributes of learning, scale and equality in the community.



Images of the final RABIT event and follow-up workshops in Barrio Luján, Costa Rica

## References

<sup>i</sup> Ezilon Maps, 2014. <u>http://www.ezilon.com/maps/north-america/costa-rica-road-maps.html</u>

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<sup>xvi</sup> Further information about KETSO is available at <u>www.ketso.com</u>

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