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Applying the ARC-D toolkit to improve community resilience to wildland-urban interface (WUI) forest fire

CASE STUDY

IN MIRAVALLE COMMUNITY, VALLE DE ÁNGELES MUNICIPALITY, HONDURAS

Special thanks to:
"Barrio Resiliente Incendios Interfaz: Operationalizing the neighborhood approach to reduce risks from fires in WUI areas" Project

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Acronyms

ARC-D	Analysis of the Resilience of Communities to Disasters
BHA	Bureau for Humanitarian Assistance
COPECO	Permanent Contingency Commission
DRR	Disaster Risk Reduction
EWRS	Early Warning and Response Systems
ICF	National Institute of Forest Conservation
MEAL	Monitoring, Evaluation, Accountability & Learning
MCD	Municipality of the Central District
WUI	Wildland-Urban Interface
SBC	Social and Behavior Change
SINAGER	National Risk Management System
OFDA	Office of US Foreign Disaster Assistance

I. Summary

In April 2019, GOAL completed a community resilience assessment using the "Analysis of Resilience of Communities to Disasters (ARC-D)" Toolkit to provide input for the proposal to improve urban interface fire resilience using the resilient neighborhood model. The ARC-D assessment was undertaken by the GOAL Monitoring, Evaluation, Accountability and Learning (MEAL) team in Honduras. The urban resilience model **"Barrio Resiliente Incendios Interfaz: Operationalizing the neighborhood approach to reduce risks from fires in WUI areas"** scans four high risk communities located in the Wildland-Urban Interface (WUI) areas across the Central District and Valle de Angeles municipalities in Honduras.

The Miravalle community in Valle de Ángeles municipality was selected as the target community for the assessment. Key informant interviews and a Focus Group Discussion session were developed to complete Part A & B of the toolkit.

Assessment results show that the Miravalle community has a Low Resilience or 39% total resilience to WUI forest fires. This mainly relates to Disaster Risk Reduction (DRR) and land use planning, lack of risk assessments, and partnerships.

Projections from the MEAL team indicated that the implementation of the Barrio Resiliente Incendios Interfaz model could spark improvements in 8 resilience components, such as risk assessments, Early Warning System, dissemination of information, capacities in DRR, and promoting inclusion and partnerships.

The assessment served as a valuable case study for documenting the ARC-D assessment process and provides relevant insight into using practical approaches for urban resilience programming. Learnings, challenges and recommendations for applying the ARC-D toolkit for assessing urban resilience are presented in this case study.

II. Context

The Municipality of the Central District (MCD) includes Tegucigalpa, the capital city of Honduras, and is surrounded by the economically active, rural municipalities of Lepaterique, Tatumbla, Valle de Ángeles, Santa Lucía and Talanga. These rural municipalities are distinctive due to their dense rainforests and dry tropical forests, local agriculture production, and tourist attractions. This is in stark contrast with Tegucigalpa, a rapidly growing urban hub of business, commerce, and informal settlements. This urban expansion is encroaching on these neighboring rural municipalities – especially Valle de Angeles and Santa Lucía[1].

This phenomenon places critical pressure over existing Wildland-Urban Interface (WUI) areas and creates greater risk of forest fire propagation in Tegucigalpa and Valle de Angeles[2]. In Valle de Angeles, a rise in the frequency of forest fires is expected[3], partly due to the spread of informal settlements in WUI areas, combined with climactic variations.

Other environmental stresses – severe drought conditions and outbreaks of the southern pine beetle – further increase the risk of forest fires in the WUI area during the annual dry season period (Jan-May). The smog from these fires affects the health and security of communities, and the fires themselves further degrade already vulnerable ecological systems, as is the case with the La Tigra National Park and Guacerique river watershed.

[1] Estudio de Crecimiento Urbano, IDOM, 2015
[2] Región 12 Secretario de Desarrollo y Uso de la Tierra, Secretario Técnico y de Cooperación, 2014
[3] Modelo basado en probabilidad de ocurrencia de incendios, ICF, 2017 - 2018

1. About "Barrio Resiliente Incendios Interfaz"[4]

For the past 8 years in Tegucigalpa, with funding from USAID/OFDA[5], GOAL has been facilitating a neighborhood approach called **Barrio Resiliente** in eight high risk neighborhoods within disaster-prone areas. This experience ensured Barrio Resiliente evolved into a model for approaching disaster risk in vulnerable, informal urban communities. In 2019, GOAL together with the Municipality of Distrito Central and other stakeholders began working on a new, adapted version of the urban resilience approach called **"Barrio Resiliente Incendios Interfaz" (Wildfire Resilience Neighbourhoods) urban resilience model.**

The design contemplated adapting the original Barrio Resiliente model to focus more on reducing the risk of fire outbreaks in four high risk communities located in WUI (Wildland-Urban-Interface) areas in the Central District and Valle de Angeles municipalities, with an estimated population of 3,422 residents. Another aim was to improve the functionality of socio-economic systems critical to WUI forest fires, considered to be Early Warning and Response Systems (EWRS) against fire outbreak and the coordination system between main stakeholders of the National Risk Management System (SINAGER in Spanish). Barrio Resiliente Incendios Interfaz emphasizes community scale and capacity strengthening to guarantee that communities can absorb, adapt, and/or transform in the face of the impact of wildfire related shocks and stresses while avoiding negative consequences on growth and development.

The **Barrio Resiliente Incendios Interfaz** design includes activities such as developing risk maps, establishing an Early Warning and Response System to forest fires, and conducting behavior change campaigns focused on prevention and response to WUI area forest fires. Additionally, the model aims to develop community and home level risk reduction plans, with special attention on measures a household can take, including within its surroundings to mitigate against fires. Furthermore, the awareness raising, and training implemented by the project considers the protection and inclusion of vulnerable groups and a systemic focus targets the improvement of capacities, coordination and communication between actors working on WUI area forest fires to create DRR alliances, ensuring operation and maintenance of EWRS, and developing effective actions for prevention and mitigation of fire risk.

To inform the Barrio Resiliente Incendios Interfaz design, an ARC-D assessment was undertaken in the Miravalle community of the Valle de Angeles municipality. It should be noted, that at the time of the assessment the intervention was postponed by the donor. As of 2021, the intervention is being renewed with involvement of more actors, with Miravalle within the target communities. The proposed intervention assigns the ARC-D application as the tool to measure the resilience to disasters of the target territories, in relation to Disaster Risk Reduction Policy and Practice.

[4] In English, "Resilient Neighbourhoods Interface Wildfires"

[5] Now known as BHA

2. The ARC-D Toolkit

TABLE 1. ARC-D TOOLKIT OVERVIEW AND STRUCTURE

What is the ARC-D Toolkit? How is it structured?

Strategies or interventions that are designed to build resilience should be based in a clear framework that considers resilience to whom and to what disaster risk scenario(s). They must be context-specific and based upon evidence to achieve long term sustainability.

The ARC-D toolkit assesses a community's resilience to disasters from a qualitative perspective and is applied at community level. Structured into 2 practical sections, it consists of field visits, interviews and a 1-2 day assessment with a Focus Group Discussion (FGD). Resources include an orientation manual for the user and access to a platform for digital data gathering. [6]

Since 2015, ARC-D has been applied in 15 countries in three continents: Honduras, Nicaragua, Cuba, Colombia, Haiti, Niger, Sudan, South Sudan, Ethiopia, Kenya, Uganda, Malawi, Philippines, Sierra Leone, and Mexico. It has been widely used in Honduras and Haiti, with more than 260 evaluations carried out to monitor and evaluate GOAL's programs and other donor programs (including the European Union and USAID).

The sections of the toolkit

Part A

Part A assesses the general context of the community and determines the risk scenario.

It captures essential data about the local population, governance structures, the built environment, the attributes of the system, vulnerable groups, shocks and stresses and coping mechanisms.

Operationally, Part A requires the completion of tasks and activities such as deskwork and document revision, interviews to key informants, and in-field observations. The scope of Part A is defined by the context, so varying degrees of information often result.

Part B

Part B evaluates the level of community resilience to the chosen disaster risk scenario of Part A. Using a 1-5 scale, 30 key questions are discussed and validated with an already selected Focus Group. Each question is given a score from 1-5, where 1 indicates characteristics of very weak resilience (you assign 1 point), and 5 indicates characteristics of strong resilience (you assign 5 points). At the end of the entire evaluation process, a total resilience score for the 30 questions is calculated and is equivalent to the **level of the community resilience to disasters**.

A) **The 30 components can be classified in 4 key thematic areas from the Sendai Framework 2015-30 on DRR:**
   1. Understanding disaster risk
   2. Strengthening governance to manage disaster risk
   3. Reducing vulnerability to improve resilience
   4. Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery.

B) **These 30 components can also be grouped in 8 key system sectors:** education, economic, environment, political/governance, health, infrastructure, social/cultural, and disaster risk management.

The CommCare application for digitalizing data

To digitalize data from assessments, ARC-D uses an open-source data collection platform called CommCare that operates on Android devices or internet browsers and stores data on cloud-hosted servers. The CommCare application can work offline and once connected to the internet, sends the assessment data to the project's CommCare database. This sent data can then be exported onto an offline Excel or Power BI dashboard.

[6] For more information on the ARC-D, please visit: http://resiliencenexus.org/arc_d_toolkit/what-it-is/

3. Preparing for the ARC-D field visit

A team consisting of 2 facilitators and 3 observers were involved in the ARC-D assessment process. The facilitators were from the GOAL Honduras MEAL team, while the observers were staff from GOAL's programmes in the last stage of gaining their ARC-D certificate. The ARC-D certificate is a 4-day training which familiarizes participants with the toolkit, preparing them to apply it in the field. It includes a practical session (real or simulated) with a focus group discussion to complete Part B successfully.

The first phase of the process involved planning the evaluation and booking the session with community members. The second phase involved some research to fill in Part A, a field visit to gather contextual information, and finally conducting the focus group discussion. Following the focus group session, the team reviewed the quality of the results, completed the report, and uploaded the data to the CommCare platform.

Context of the community

The Miravalle community is located in the buffer and core zone[7] of La Tigra National Park in the Valle de Angeles municipality. It is located close to the main town of Valle de Ángeles, approximately 15km from the capital city of Tegucigalpa. Data from the 2013 Census of the National Statistics Institute (INE) estimates Miravalle has a total population of 567 habitants, or approximately 169 households. The population includes 286 men and 281 women, including children and elders.

Two types of ecosystems predominate in the area: mixed lower montane seasonal evergreen tropical forest and higher montane broadleaf evergreen tropical forest. The main livelihood of the community is salaried work, which is carried out predominantly in Tegucigalpa, with it being estimated that 80% of the population of Miravalle are engaged in domestic work, cleaning services, and surveillance among others. Women and men alike are engaged in this type of employment. The remaining 20% of the population carry out their work in the community, with many having wood or metal carving workshops, work generally carried out by men. As for women within this proportion of the population, the vast majority are housewives. Finally, a minimum number of people (2 or 3) are engaged in agriculture. Community residents recognised that the greatest impact of forest fires is damage to water sources and the proliferation of respiratory diseases.

In terms of coping mechanisms, community members, mainly members of Water Committees, carry out preventive patrols in the summer season, and they also fight fires collaboratively between residents of the community itself and sometimes nearby communities. These actions are completed with the tools available at the time (shovels, hoes, green branches) and are carried out while receiving the assistance from the Municipal Environmental Unit (UMA for its acronym in Spanish), members of COPECO and firefighters.

Before the field visit

Building community relationships or familiarization with the community is strongly suggested prior to conducting the focus group discussion. This assessment was conducted in close proximity to the GOAL offices, and additionally GOAL had previously worked with Miravalle community leaders. Establishing contact with the main community leaderand booking the sessions was swiftly completed by the team. A week before the focus groups session, the team travelled to Miravalle to monitor the status of the roads, and to personally deliver written invitations to each person invited.

[7] Buffer zone: zonal area that lies between two different zones areas, in this case, an area peripheral to a specific protected area. Core zone: area of heterogeneous, relatively undeveloped, unfragmented forest.

4. Implementing Part A and Part B

The facilitation team began to complete Part A in the office with data from various secondary sources that were already available from GOAL's programming and institutional data. The main official sources were INEs database[8], GIS maps[9], and the PNLT[10] Management Plan. After the preliminary desk research, key information for Part A remained incomplete, and it was decided to interview 4 community members prior to the Part B session, to complete Part A.

During field implementation, the first activity was conducting the four Key Informant Interviews to complete Part A. Interviews were completed in approximately two hours and satisfactorily provided the desired information. The last section of Part A, the **risk scenario** was already prioritized: **forest fires in Wildland-Urban Interface (WUI) areas**.

For this ARC-D application, only 1 focus group discussion was developed as there was no justification for needing separate groups (for example gender dynamics or power disparities). The group was booked three weeks in advance of the FGD, to ensure, as best as possible, an appropriate profile and representation of the community members. There were 14 community members invited to the FGD session.

For the Focus Group session of Part B, women and men from the Local Water Committee (JAA in Spanish), a local youth support group, mothers, and elders participated.

The two facilitator's roles consisted of one moderating the session and the other as the note taker. The moderator validated the scoring by concluding each discussion with a verbal consensus of the score before moving on to the next discussion. The focus group discussion lasted around 3.5 hours, with snacks and breaks provided to participants.

The note taker documented all qualitative data in writing, as the CommCare Web App was not used to register qualitative data at this time. The data was later reviewed for quality control and lastly registered in the CommCare mobile phone app. At this point, the facilitators decided results were adequate and the assessment was completed.

The community information and assessment results are shown in the Resilience Nexus website: https://resiliencenexus.org/global_scores/all-scores/. To view the Miravalle community assessment results, make sure to activate the Community filter for Miravalle.

[8] National Statistics Institute (INE in Spanish)
[9] Geographical Information Systems (GIS)
[10] La Tigra National Park (PNLT in Spanish)

5. Evaluation results of Part B

The final score of the ARC-D evaluation in Miravalle establishes the state of resilience to WUI forest fires as "38.92% resilience, Level 2 or Low Resilience: Some awareness and motivation, some action, but action is piecemeal and short-term" (see Table 2).

Graphic 1 below shows each of the 30 resilience components scores. The spider graph shows which components ranked as minimal resilience and which ranked as nearing resilience. It shows the score, from 1-5, that each component obtained during the Focus Group discussion.

TABLE 2. RESILIENCE LEVEL SCORE TABLE USED TO ASSESS EACH COMPONENT

0-30% 30-45 points	1	Very low resilience	Little awareness of issues and no action.
31-50% 46-75 points	2	Low resilience	Some awareness and motivation, some action, but action is piecemeal and short term.
51-70% 76-105 points	3	Medium resilience	Awareness and long-term action, but these are not linked to a long-term strategy and/or not all aspects of the problem are addressed.
71-90% 106-135 points	4	Close to resilience	Actions are long-term, linked to strategy and address main aspects of the issue, but there are still deficiencies (especially systemic) in implementation.
91-100% 136-150 points	5	Resilience	Actions are long-term, linked to strategy, addressing all aspects of the issue, embedded in society and sustainable.

For clarity, the location of the orange circles indicates the level of resilience. Beginning from the center of the circle, Level 1 or Minimal resilience, increases until reaching the outer perimeter that represents Level 5, or Resilience (refer to table 2 for a description of each resilience level). The numbers beside the title of the component refer to the 4 thematic areas as described in the toolkit.

The assessment shows that to improve community resilience to disasters in Miravalle, actions must range from DRR awareness and better practices on environmental management to higher level changes such as incorporating DRR in land use and development planning, or social protection.

The results also reflect how their social structure has high resilience characteristics in relation to participation of women, social cohesion, and health access. Community members and leaders are aware of the risks they face and show positive interest to address these issues. On the downside, their level of preparedness to disasters and access to resources is minimal alongside an absence of planning, while other stresses linked to housing and finances affect their wellbeing and livelihoods (see Table 3).

TABLE 3. COMPONENTS THAT RATED LOWEST OR HIGHEST RESILIENCE LEVELS

Level 1 – Minimal resilience	Level 4 – Nearing resilience
→ Participatory community risk assessment, Technical/scientific risk assessment → DRR in development planning → DRR in land use planning → Partnerships for DRR and recovery → Access to financial services → Housing → Contingency and Recovery Planning → Early Warning System → Capacity in preparedness, response and early recovery → Emergency Infrastructure	→ Social cohesion and conflict prevention → Health access and awareness → Women's participation

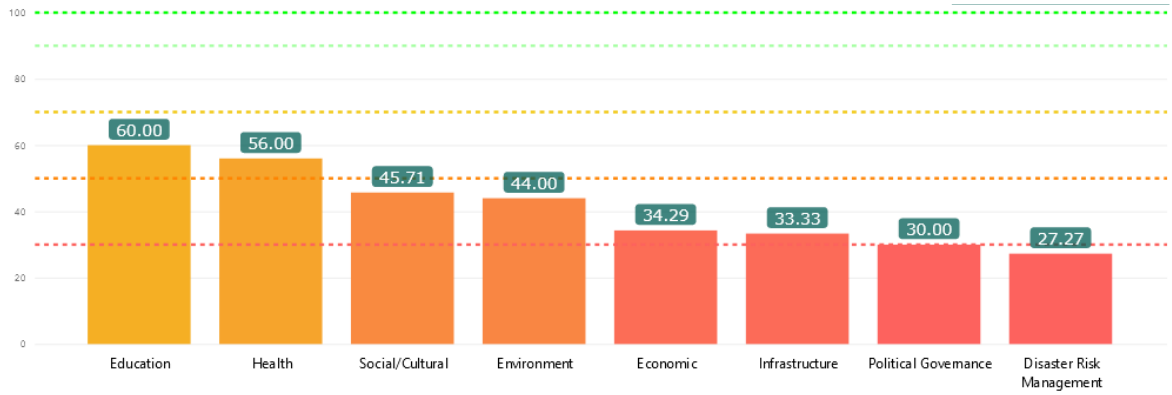
From a social perspective, the evaluation highlights how the community has a certain level of consciousness to the risks of wildfires, yet there is not a strongly perceived attitude and behavior toward improving their situation. Even though the community demonstrated certain levels of coordination and decision making among

community members, their relationships require strengthening to increase disaster resilience capacities. It is also important to highlight that the strongest resilience components (Social cohesion and conflict prevention, health access and awareness & women's participation) do not depend on external actors. It means that taking into account the resilience capacities of communities during the design and implementing stage of humanitarian or development programmes is crucial to avoid doing harm and effectively contribute to a resilient wellbeing.

Overall, the results highlight how some critical socio-economic system sectors[11] are not connected or are not contributing to the community resilience, while others contribute to a higher resilience capacity (see Image 1). From analyzing and mapping critical socio-economic systems, such as early warning systems, land use planning and urban planning, strategic interventions can help to achieve long term resilience outcomes.

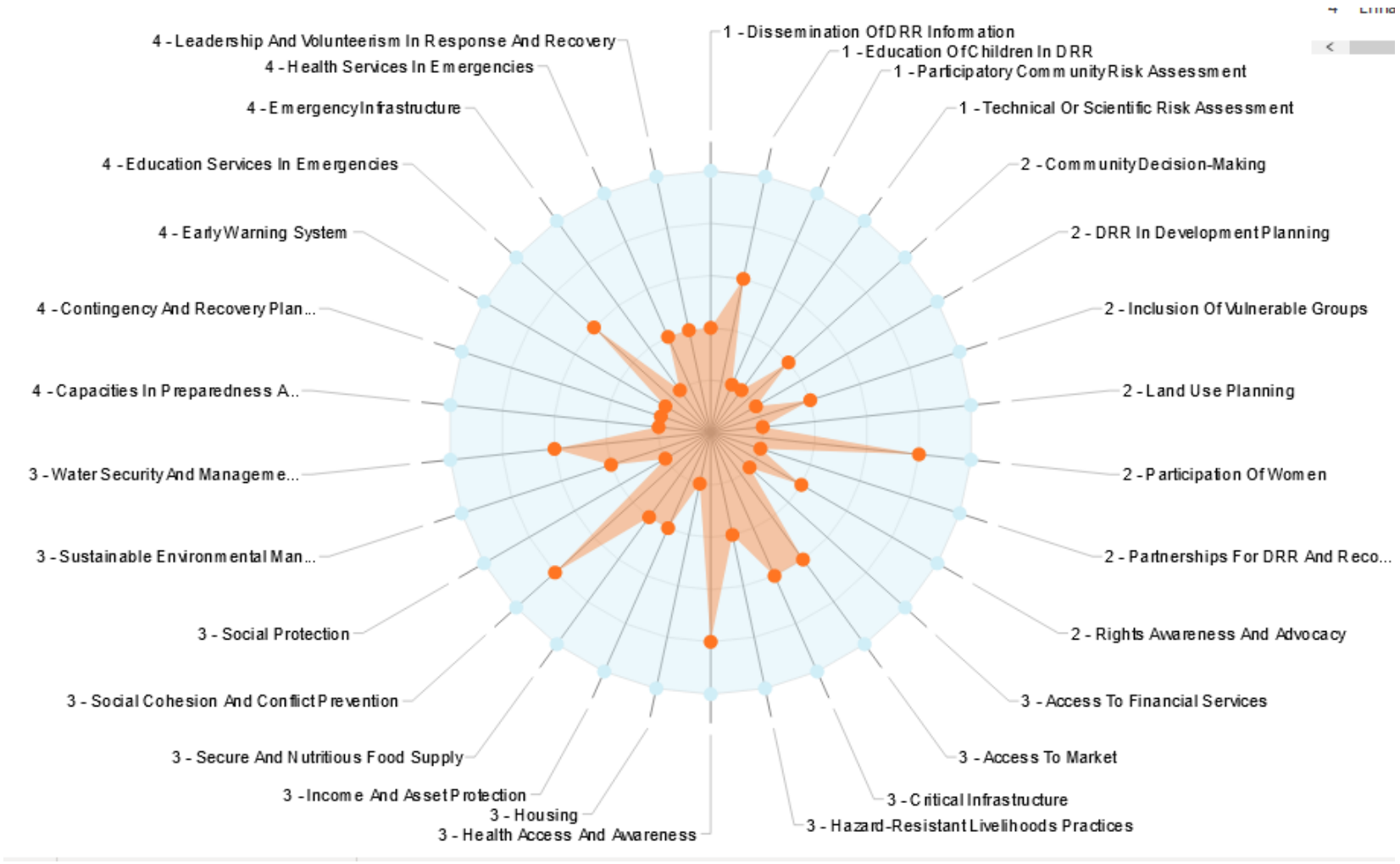
Large initiatives can be promoted, with engagement from the community, to raise the level of awareness of all or the majority of community members and encourage them to prevent or act upon wildfire events. Community actors working together can guarantee the establishment and operation of early warning systems, development of contingency plans and strengthening skills in preparation and response to fires. Demonstrating a strong social web can open channels to strengthening collaboration and communication between external actors, community members, local government, and other relevant actors.

IMAGE 1. AVERAGE SYSTEM SECTORS SCORES



[11] See Table 1 for a list of the ARC-D´s 8 system sectors

GRAPHIC 1. SPIDER GRAPH SHOWING EACH RESULTING RESILIENCE LEVEL BY COMPONENT AND THEMATIC AREA



Note. The graph was copied from the Power BI dashboard available in the Resilience Nexus *Website*.

Source: (GOAL, 2019)

6. Problems encountered

- Due to resource limitations, the assessment was implemented in only one of four targeted communities.
- The participant number was the minimum that the toolkit requires. Eight of fourteen (8/14) or 60% of invited members did not attend, even though the FGD was planned for a Saturday and invitations were handed out personally.
- Even though all community organizations were invited to the FGD, in Miravalle there are very few community groups; apart from the Local Water Committee (JAA in Spanish), community support groups, health volunteer/workers, a teacher and a parent association, there are no other types of groups or organizations.
- Because Part A final inquiries and the entire Part B session was completed in one day, the process was drawn out for both facilitators and the participants that were present from beginning to end.
- Postponing the programme led to resilience score results being communicated to Miravalle leaders by phone and email rather than personally, as the budget was cut short for a socialization visit.

7. Lessons Learnt

- Together with the local government, resilience assessments such as the ARC-D should be planned ahead of project implementation, and if possible, during the design phase. Better planning ensures that more target communities are included in the needs assessment.
- For practicality and ease of use, it is recommended to use the CommCare Web App on a laptop after the field work to upload qualitative data and have enough time to confirm resilience scores.
- Ideally plan for two or more days to account for any contingencies with the Focus Group Discussion (undesirable turnout, uncertainty of scores, etc.) and for less tiresome sessions that may ultimately led to errors or bias in the scoring. Planning for this increased amount of time is even more important when the researcher or team have no experience in the area.
- Budget a final brief visit to socialize the score with community leaders, although phone and email can work as well.

8. Recommendations for Barrio Resiliente Incendios Interfaz

Of the 30 components encompassing ARC-D, 8 are priority to increase the resilience level score from Low Resilience to Medium Resilience, thereby representing a quick win for the Barrio Resiliente Incendios Interfaz project. These 8 components are:

1. Participatory community risk assessment
2. Scientific and technical risk assessment
3. Dissemination of DRR information
8. Inclusion of vulnerable groups
11. Partnerships for DRR and recovery
12. Sustainable environmental management
25. Early Warning System
26. Capacities in preparedness, response, and early recovery

- In Miravalle, potential action lies in strengthening collaboration and communication channels between external actors, community members, local government, and other relevant actors for establishing and operating an Early Warning System for wildfires, developing contingency plans and strengthening their skills in preparation and response to wildfires.
- Early Warning System for Wildfires, among all initiatives to strengthen communities' resilience to disasters, could be a quick win as it has the greatest potential to increase resilience with minimum resources investment.
- Identifying key behaviors and barriers that prevent preparation and response action to Wildland-Urban Interface fires is recommended. From these findings, a Social and Behavior Change campaign could be developed aimed at increasing community participation or mobilization in relation to DRR.
- Increasing and focusing efforts on promoting initiatives to raise the level of awareness of the risk of wildfires for all or the majority of community members should be implemented. Such efforts would motivate community members to prevent or act upon wildfire events that will likely occur.
- Urban planning and land use regulation need to be part of a longer-term strategy that starts with policymaking actors, such as the local government, ministries, and other related governmental agencies.
- The ARC-D toolkit can be used to monitor and evaluate the programmes contribution to communities' disaster resilience. Its participatory nature may be useful for an active involvement of community leaders as part of the monitoring team.

TABLE 4. ADVANTAGES AND OPPORTUNITIES OF THE ARC-D TOOLKIT

Box 2: Advantages and opportunities of the ARC-D Toolkit

For organizations, decision makers, as well as communities and institutions involved in applying the tool:

» It is a rapid evaluation of the main risk scenarios that particularly affect the community.

» The resilience components of the community can be captured in a holistic picture.

» The tool presents a learning opportunity to understand the community's existing coping mechanisms.

» Well applied, the toolkit increases knowledge and awareness by the community about the risks they are exposed to, their level of resilience to them, and what measures can be taken to increase their resilience to the risk scenario.

» It is versatile as it can also be used as a diagnostic, evaluation or planning tool, and ultimately contribute to strategic frameworks for building community resilience to disasters.

» It helps to highlight the fundamental problems related to poverty and vulnerability.

» The method is geared towards sparking conversation and fostering integration and understanding between the facilitating team and the focal group participants.

» Its design is completely aligned with the global politic on DRR, as described in the Sendai Action Framework.

» ARC-D's solid resilience framework can serve to analyse capacities in diverse contexts while being flexible enough to adapt the tool to changing or specific circumstances that are found in every community.

Bibliography

GOAL. (2019). *All Scores*. Retrieved from Resilence Nexus: https://resiliencenexus.org/global_scores/resilience-radar/