POLICY BRIEF

Increasing community resilience through community-based disaster risk management

Evidence and lessons learned from an impact evaluation in Honduras

2019

The department of Olancho / Honduras is a multi-hazard exposed area, almost annually affected by tropical storms and hurricanes, subsequent floods and landslides and more frequently even by droughts. In this remote area, the majority of this rural population lives under difficult economic conditions and public services are scarce. The Swiss and the Honduran Red Cross have jointly implemented a multi-year disaster risk reduction programme, focussing on building up community organisation and locally adapted prevention and mitigation measures. The program started working with several emergency and relief operations, from 2009 onwards building up a comprehensive disaster risk management approach and rolling it out stepwise in 75 communities in 3 municipalities.

In 2018, Swiss Red Cross started a research partnership with the Cooperation and Development Center (CODEV) of EPFL in order to carry out an impact evaluation on this programme, co-funded by the SDC / NADEL-ETHZ impact award.

Community training on hazard assessment, Olancho / Honduras 2019

Strengthen disaster resilience

Central to this community-based disaster risk reduction approach implemented in Olancho is the focus on community committees, they are organized, trained, equipped, brought to official recognition and linked to the national Disaster Management system. Further main building blocks of the intervention are: disaster preparedness, prevention and mitigation. In disaster preparedness, the first step in CBDRM, communities and partners are trained and supported in contingency planning, early warning, search & rescue, evacuation, logistics, health services in emergency, shelter and relief operations.

Prevention and disaster risk mitigation builds on hazard and risk assessments, complemented with traditional risk knowledge and coping mechanisms of the communities. Based on this combined knowledge, prevention and mitigation measures are defined, prioritized and established in a participatory way. Measures include "green" ecosystem based measures as well as "grey" infrastructure. All measures are locally affordable in terms of material costs and/or human resources.

Capacity building also involves local authorities. They are trained and supported in organizational processes. Sound hazard and risk studies serve as an instrument for risk oriented decision making and are officially recognized and integrated in the municipal development and investment plans.

Co-funded by Swiss Agency for Development and Cooperation SDC, in collaboration with Ecole politechnique fédérale de Lausanne EPFL-CODEV, with supervision from NADEL-ETHZ

Researchers:
Silvia Hostettler, Deputy Director CODEV-EPFL
Alfredo Kägi, Scientific Collaborator CODEV-EPFL
Maria Sarabia, Research Associate CODEV-EPFL
Anthony Davison, Professor of Statistics, EPFL

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Key findings

Disaster risk reduction pays off. Community based disaster risk management programmes have a positive effect. Well implemented, accepted and maintained measures have a cost-benefit ratio up to 1:6. Knowledge, social cohesion and natural resource management are sustainably strengthened.

Benefits of community based approach. Local organizations are the most important knowledge carriers and implementers, even in fragile contexts. Long-term commitments in development cooperation programming are crucial in order to strengthen the self-management capacity of community organisations sustainably.

Holistic programmes work. Although more difficult to evaluate than single interventions, the programme focussing in parallel on community building, disaster risk management and health leads to significant and relevant results with regard to the resilience of the population, including the creation of non-intended co-benefits

From risk to opportunity. Soil-bioengineering measures not only reduce risks of landslides, but provides multiple co-benefits to the communities, as enhanced quality and quantity of arable land. Hence investment in prevention also pays off if no disaster takes places.

Methodological summary

The main question of this evaluation was: Did the Swiss Red Cross DRM program have an impact in the communities in Olancho, Honduras? In technical terms, is the program impact different from zero?

The key to causal inference is to estimate what the outcomes would have been if the intervened communities had not been intervened. Due to fact that the programme was already ongoing and consistent baseline data throughout the various programme phases was not available, the statistical techniques of propensity score matching and propensity score weighting were applied.

Based on a hazard assessment done with the same methodology as originally the intervention communities were assessed and selected, 102 comparably exposed communities in treated and not treated areas were identified, 810 interviews at household level conducted, and additionally 17 qualitative expert interviews realized. For the second research question additionally the results of the cost-benefit analysis based on a methodology developed by Swiss Development Cooperation (SDC) were integrated.

Evaluation questions

Did the Swiss Red Cross DRM program have an impact in the communities in Olancho, Honduras? In technical terms, is the program impact different from zero?

- Is there a difference in the resilience level of communities intervened compared to those not intervened?
- To what extent do soil-bioengineering techniques allow for cost-effective mitigation of flooding/landslide events in the study area?
- To what extent are communities ready and prepared to appropriately respond to flooding/landslides events in the study area?

Results

The impact evaluation confirms a significant effect in the beneficiary communities with regard to all research questions.

In comparison to the non-intervened communities, important differences were discovered in three important aspects of **resilience**[1] in the beneficiary communities: knowledge and preparedness, social organization and cohesion, and management of natural assets.

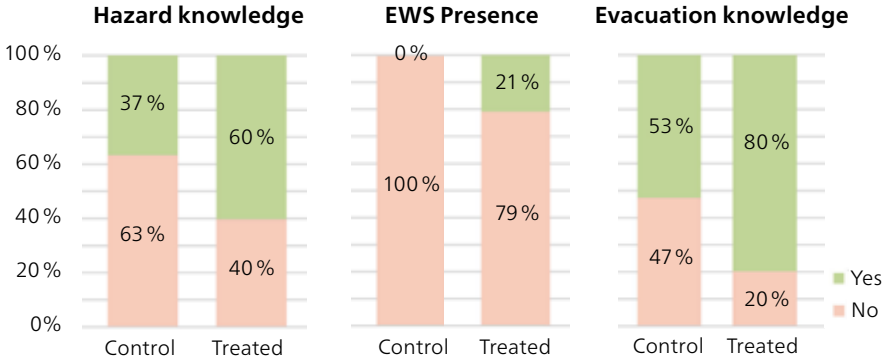
Knowledge and preparedness and its co-benefits

In terms of preparedness knowledge, different core components of community preparedness have been tested and showed significant differences: The knowledge about local hazards, about Early Warning Systems (EWS) and about evacuation routes and procedures. Within the treated communities, 63 % of the individuals have proofed knowledge with regard to local hazards, compared to 37 % in the control communities.

The difference grew with regard to the presence of Early Warning Systems (EWS). None of the households in the control communities reported knowing if there was a EWS in place, compared to 21% in the treated communities. Equally the difference with regard to evacuation knowledge shows a clear difference between the treated and the non-treated communities.

Community organization strengthens overall social cohesion

Social cohesion is an important aspect of resilience, as it allows communities to act and to take care of itself. The study has found evidence that there is a greater degree of social cohesion in the treated communities. Key finding are in the different results in treated households reporting that the emergency committees are active (79 percentage points), and that 55 % of the households



1 IFRC (2014) defines resilience as "the ability of individuals, communities, organizations or countries exposed to disasters, crises and underlying vulnerabilities to anticipate, prepare for, reduce the impact of, cope with and recover from the effects of shocks and stresses without compromising their long-term prospects. A resilient community has the following characteristics: It is 1. knowledgeable, healthy and can meet its basic needs, 2. Is socially cohesive, 3. Has economic opportunities, 4. Has well-maintained and accessible infrastructure and services, 5. Can manage its natural assets, 6. Is connected.

reported having a family member that is part of the CODEL. Beyond this organisational strength involving half of the households, which was also confirmed in the participation rates in the trainings and drills and in the existence and use of community preparedness and contingency plans, evidence was found with regard to greater degree of social cohesion beyond the organisational structure in the treated communities. On the aspect of mutual assistance in the event of an emergency, 26 % of the respondents from the control communities believed that they would only help their family members compared to only 8 % from the treated communities. Furthermore, only 38 % of the respondents from the control communities believed that the members of the community would help each other in an orderly manner, whereas in the treated communities, this percentage was significantly higher (61 %).

Management of natural assets leading to healthy environment and environmental health

Sustainable management of the (often scarce) natural resources is key for the community resilience. As part of the program a variety of measures for natural resource management have been introduced (e.g. water management, reforestation and reduction for soil degradation). Focussing in the evaluation specifically on "ecofogones" (ecological and economic stoves) and on waste management, both components show positive results. The stoves reduce the amount of firewood required to cook, and contribute to achieve better health indicators by reducing the respiratory diseases and the accidents. The average number of logs used per person per day to cook was 6.8, whereas in the treated communities this was 4.9. The estimated difference is a decrease of 1.91 logs per person per day, which is not only statistically significant but also economically and ecologically significant. Further, the soil bioengineering measures do not only decrease the risk of landslides but provide the multiple benefits. For example the opportunity to plant fruits and vegetables, establish medical herb gardens, fuelwood, rainwater harvesting and a vermicompost.

Cost-effectiveness of soil-bioengeneering

The program has enhanced the capacities of the communities to prepare for future hazards and to respond in case of an emergency. With regard to the cost-effectiveness of soil bio-engineering measures, two full cost-benefit analyses were conducted by an external evaluator, who also trained the HRC/SRC team in conducting cost-benefit analyses independently. Both analysis showed positive results, measuring the cost-effectiveness for the flood and landslide risk protection measure applied at a school at 4.5, and for similar measures at the level of two households even at 6 (cost-benefit ratio between 2 and 5 is considered cost efficient, cost benefit ratio over 5 is considered highly cost efficient). The study also found significant evidence that supports the positive effect the program has had on the way communities regard their level of preparedness to react to the effects of possible disasters, compared to those same impressions in control communities.

Conclusions

The findings show a positive and significant effect on the treated communities in three important areas of resilience:

- **Knowledge and preparedness:** As much at individual and household level as at community level people in the beneficiary communities had significantly greater knowledge on the local hazards such as floods and landslides, and on how to be better prepared for them, than people in the control communities.
- **Social cohesion:** The strengthened community organization as a fundament of disaster preparedness has been confirmed, further the programme had a significant effect on the social cohesion of the beneficiary communities, measured as the willingness of mutual assistance beyond assistance to the own family and the use of the organizational capacity also for other community interests.
- **Management of natural assets:** the increased community-based and community-shared knowledge with regard to the risks and hazards and the related measures to mitigate them leads also to a significant increase of conscious management of natural assets (e.g. wood, water) which are important components of a community's resilience.

Moreover, soil bioengineering measures not only decrease the risk of landslides, but also provide multiple benefits (e.g. the opportunity to plant fruits and vegetables, create medicinal herb gardens, firewood, rainwater harvesting and a vermicompost).

The program has enhanced the communities' capacities to prepare for future risks and respond in the event of an emergency. Moreover, the program's community-based focus is central for reinforcing community cohesion through the establishment of community committees.

Some of the **key elements** found for ensuring effectiveness of resilience-building were:

- Carefully fostered collaboration with communities
- Long-term duration of programme, working with the communities 5 to 10 years
- Scientific risk studies combined with participative and inclusive mapping and local konwledge
- Use of an integrated approach wherein disaster risk mitigation measures provide multiple benefits
- An excellent cost-benefit ratio of the measures implemented
- Requiring contributions from the community (labor, planting material) builds commitment
- Capacity building in leadership at the community level fosters ownership
- Reliable delivery of promised services and regular visits builds trust
- A link to municipal-level development plans contributes to long-term sustainability

The community-based approach empowers communities by building self-confidence so that they may ultimately take responsibility for their own destinies and strengthen their capacities for resilience in a long term perspective.

Recommendations

The impact evaluation of the programme confirms the positive effects of this holistic programme. Central factors of its success are its long-term commitment, its solid and comprehensive methodology and its multidisciplinary approach. Based on the results, the following recommendations can be derived for various actors in international cooperation:

At operational level

- This successful CBDRM approach of the Swiss and Honduran Red Cross should be scaled up and continued in the country, as there are other regions with similar characteristics of exposure to hazards.
- The participatory and holistic evolution of the programme planning and implementation led to a well anchored and locally adapted programme – at the expense of robust and consistent monitoring data. Base and end lines should be collected more systematically.
- As a point of institutional evaluation policy, Impact Evaluations should already be planned during the initial stages of program and project design in order to guarantee availability of human, information and financial resources.

To the policy and donor partners

- Disaster risk management programmes pay off and reduce costs for relief, rehabilitation and recovery after disasters.
- In order to be successful and sustainable in a long term perspective, there is a need for continuous and long term engagement which allows cooperation partners to build trust, solid organizational structures and sustainable results.
- Aid agencies should be given long-term support in the implementation of evaluations and applied research in order to continuously improve their programmes on the basis of solid evidence.

To the Red Cross / Red Crescent Mouvement

- CBDRM is an important contribution to community resilience strengthening. Red Cross partners could take advantage of the experience practiced in Olancho and engage in a similar holistic and long-term approach, beyond shorter term interventions in relief and preparedness.
- Impact Evaluation outcomes should generally be used to identify and upscale promising approaches, inform decision making and support the design of evidence based policy.

To the research community

- The evidence gap in CBDRM and resilience, compared to other sectors in international cooperation, is still big, further evaluations and research are needed.
- Impact Evaluation outcomes should be used to identify and upscale promising approaches, inform decision making and support the design of evidence based policy.

Selected references

ARUP International Development (2011). Caracteristics of a safe and resilient community. Community based disaster risk reduction study. IFRC 1224200 E 05/2012

Caliendo, M., & Kopeinig, S. (2005). Some Practical Guidance for the Implementation of Propensity Score Matching. DIW Discussion Paper, 485(1), 1–29. https://doi.org/10.1111/j.1467-6419.2007.00527.x

Frölich, M., & Sperlich, S. (2019). Impact Evaluation. In Impact Evaluation. https://doi.org/10.1017/9781107337008

Gertler, P. J., Martinez, S., Premand, P., Rawlings, L. B., & Vermeersch, C. M. J. (2011). Impact Evaluation in Practice. In The World Bank Publications. https://doi.org/10.1596/978-0-8213-8541-8

Gertler, P., Martinez, S., Rawlings, L. B., Premand, P., & Vermeersch, C. M. J. (2016). Impact Evaulation in Practice. https://doi.org/10.1109/WI-IATW.2006.145

Guo, S., & Fraser, M. W. Propensity Score Analysis: Statistical Methods and Applications. , Counterfactual Framework and Assumptions 21–36 (2010).

Heinrich, C., Maffioli, A., & Vázquez, G. (2010). A Primer for Applying Propensity-Score Matching A Primer for Applying Propensity- Score Matching Impact-Evaluation Guidelines. (August).

Hostettler, S., Jöhr, A., Montes, C., & D'Acunzi, A. (2019). Community-based landslide risk reduction: a review of a Red Cross soil bioengineering for resilience program in Honduras. Landslides, (March), 1779–1791. https://doi.org/10.1007/s10346-019-01161-3

International Federation of Red Cross and Red Crescent Societies (2014): Framework for community resilience.

Janet Vähämäki, Martin Schmidt, and J. M. (2011). REVIEW: RESULTS BASED MANAGEMENT IN DEVELOPMENT COOPERATION.

Kalif Abdi, J., Farah Photo, S., & Jansso, E.-L. (2013). Disaster Risk Reduction Programming in Ethiopia's Somali Region Oxfam GB Adaptation and Risk Reduction Outcome Indicator.

McConnachie, M. M., Van Wilgen, B. W., Ferraro, P. J., Forsyth, A. T., Richardson, D. M., Gaertner, M., & Cowling, R. M. (2016). Using counterfactuals to evaluate the cost-effectiveness of controlling biological invasions. Ecological Applications, 26(2), 475–483. https://doi.org/10.1890/15-0351.1

Morgan, S. L., & Winship, C. (2007). Counterfactuals and Causal Inference. New York: Cambridge Unviersity Press.

Muñoz, A. (2005). Inestabilidad de laderas: Mapa de Amenazas, Recomendaciones Técnicas para su elaboración. 60.

OECD. (2010b). Quality Standards for Development Evaluation. Retrieved from https://www.oecd.org/development/evaluation/quality-standards.pdf

Patnaik, U., & Das, P. K. (2017). Do Development Interventions Confer Adaptive Capacity? Insights from Rural India. World Development, 97, 298–312. https://doi.org/10.1016/j.worlddev.2017.04.017

Perrin, B. (2012). LINKING MONITORING AND EVALUATION TO IMPACT EVALUATION. (2).

Rogers, P. (2014). Overview of Impact Evaluation. (1).

Rosenbaum, P. R., & Rubin, D. B. (1983). a. "The Central Role of the Propensity Score in Observational Studies for Causal Effects" Biometrika . Biometrika, 70 SRC-(1), 41–55. https://doi.org/10.1093/biomet/70.1.41

Swiss Red Cross
Werkstrasse 18, P.O. Box
CH–3084 Wabern, Phone +41 58 400 45 75
info@redcross.ch, www.redcross.ch

Post Finance
IBAN CH43 0900 0000 3000 4200 3