Empowered lives.
Resilient nations.

United Nations Development Programme

A GUIDE TO PRACTITIONERS

SOCIAL VULNERABILITY ASSESSMENT TOOLS FOR CLIMATE CHANGE AND DRR PROGRAMMING

SOCIAL VULNERABILITY ASSESSMENT TOOLS FOR CLIMATE CHANGE AND DRR PROGRAMMING

A GUIDE TO PRACTITIONERS

September 2017

Publisher
United Nations Development Programme

Author:
Krunoslav Katic

Contributors:
Mihail Peleah
Zeljko Pavic
Krunoslav Vukelic

Reviewers:
Katerina Kostadinova Daskalovska
Yegor Volovik

Project coordinators:
Natalia Olofinskaya
Armen Grigoryan
Milena Kozomara

Editor:
Duska Tomanovic

Design:
Nenad Vasic

Photo:
UNDP Serbia

Printed by:

Number of copies:
300

ISBN:
978-92-95092-98-3

ACKNOWLEDGEMENTS

It became apparent during my work in the field of disaster risk reduction and climate change, particularly in the South East Europe, and specifically, while dealing with the issue of the respective national Risk Assessments, that the subject of social vulnerability was inadequately addressed. This Guide was thus developed to boost and support the capacities of disaster risk reduction and climate change practitioners at the local, national and international levels. It aims to provide a tool supporting UNDP staff and project managers in planning and implementing activities, projects and programs addressing social vulnerability.

That said, I particularly wish to express my sincere gratitude to Ms. Natalia Olofinskaya, the Regional Technical Specialist – Adaptation to Climate Change, UNDP Istanbul Regional Hub, for her encouragement and guidance in preparing this Guide, and to Mr. Armen Grigoryan, the Climate Change, Disaster Resilience and Global Energy Policy Advisor, UNDP Istanbul Regional Hub, for providing me with the opportunity to embark on this project.

I would also like to thank Mr. Željko Pavić, of the Department of Cultural Studies at the University of Osijek, Croatia, Mr. Krunoslav Vukelić, of the marketing research and public opinion polling company Audeo based in Osijek, Croatia and Mr. Mihail Peleah, a Programme Specialist, UNDP Istanbul Regional Hub, for providing substantive expert input to this Guide.

Furthermore, my thanks go to peer reviewers Mrs. Katerina Kostadinova Daskalovska, an Independent Consultant and Operational Risk Manager, the former Yugoslav Republic of Macedonia and Mr. Yegor Volovik, a Portfolio Manager at UN Environment.

Last but not least, I would also like to take this opportunity to thank the Disaster Risk Reduction and Climate Change staff at UNDP South East Europe Country Offices and the Disaster Risk Reduction experts and practitioners at local and national levels in South East Europe who have been very supportive of this endeavor.

Krunoslav Katic

Table of Content

List of Tables

List of Figures

ABBREVIATIONS

UBEVI	Built Environment Index
CAPI	Computer Assisted Personal Interviewing
CARE	Cooperative for Assistance and Relief Everywhere
CATI	Computer Assisted Telephone Interviewing
CCA	Climate Change Adaptation
CRM	Climate Risk Management
CSVP	Comparable Social Vulnerability Profiling
CVCA	Climate Vulnerability Capacity Assessment
DRR	Disaster Risk Reduction
ECIS	Europe and the Commonwealth of Independent States
F2F	Face to Face
GDP	Gross Domestic Product
GEOSTAT	Geodesy Satellite
GIS	Geographic Information System
HBS	Household Budget Survey
MCA	Multi Criteria Analysis
NGO	Non Governmental Organization
PROVIA	Programme of Research on Climate Change Vulnerability, Impacts &Adaptation
RCI	Resilience Capacity Index
SD	Standard Deviation
SEVI	Socio-Economic Vulnerability Index
SoVI	Social Vulnerability Index
SVA	Social Vulnerability Analysis
UNDP	United Nations Development Programme

In the past twenty years, disasters cost more than $2 trillion, killed over 1.3 million and affected more than 4.4 billion people, including a disproportionately high number of women, children and other vulnerable groups[1]. Climate-related hazards, such as cyclones, droughts and floods, are becoming increasingly frequent and severe as a result of changing climate. In this new context of volatility, communities and nations are facing increasing, multiple and interconnected risks that can reverse years - and sometimes decades - of development progress.

Specific categories of the population (1) may face a higher risk of disasters or climate change, related to the place they are living (flood prone parts of the community, for example), crops they are growing (i.e. low cost, low yield seeds, not resilient to climate change, for example); (2) may have lower preparedness and coping capacity because they lack capitals to invest in adaptation and the decision making powers to affect public decisions on adaptation; (3) may have lower resilience/adaptation capacity because they lack access to economic and social support networks.

Climate change adaptation and risk management interventions need to be planned, designed and targeted with the clear understanding of the social vulnerability profiles of various groups of beneficiaries. Numerous methodologies are used worldwide for assessing the impact of climate change and disasters on vulnerable population groups.

Nevertheless, those social vulnerability methodologies are not systematically integrated into the overall process of climate and disaster risk management. Consequently, many studies that are meant to be "risk assessments" do not go beyond being "hazard assessments" as they lack standardized, comparable and quantifiable social dimensions of vulnerability.

A number of issues and challenges arise in defining and mapping the socially vulnerable population within climate change adaptation and disaster risk assessment frameworks. The variety of parameters used to determine social vulnerability includes, but is not limited to, income disparity, gender, age, disability, language, literacy or family status. However, personal characteristics can be linked to vulnerability, but not define it.

Group approach is widespread because it is easy to administer and use for targeting the population, but it largely ignores the internal heterogeneity of groups[2] . Availability of data on social vulnerability (i.e. obtained from censuses, pre- and post-disaster studies, public surveys, etc.), and the level at which we conduct social vulnerability studies (individual, neighborhood, community, municipality, region, etc.) are critical issues in conducting social vulnerability assessments for climate change adaptation or disaster risk reduction programs. Finally, the tools for assessing social vulnerability have to be chosen for particular programmatic or investment decisions.

[1] UNISDR (2013) Tackling future risks, economic losses and exposure
[2] More about the human centered approach in UNDP's 2011 Regional Human Development Report. Beyond Transition Towards Inclusive Societies, available at http://hdr.undp.org/en/content/beyond-transition .

UNDP has been working on integrating issues of climate, disaster risk and energy at the country level, and focusing on building resilience and ensuring that development remains risk-informed and sustainable. Since 2008, UNDP has supported more than 140 countries in accessing over $2.3 billion in grant finance to develop and implement climate change initiatives[3].

In the Europe and the Commonwealth of Independent States (ECIS) region, UNDP has been supporting a rich portfolio of project and policy initiatives addressing adaptation to climate change and disaster risk reduction.

The UNDP projects in the region have addressed diverse climate-induced threats and impacts and targeted various adaptation and risk management objectives, ranging from improved resilience of agricultural livelihoods to reduced vulnerability of communities and economies to climate-induced natural disasters. These interventions are designed to target the most vulnerable people and communities and leave a legacy of inclusive gender-sensitive adaptation planning and risk reduction.

The aim of this Guide is to first and foremost serve as a user friendly knowledge product on Social Vulnerability Assessment (SVA) approaches and tools. This Guide provides information about on-going and future planning and programming in the areas of climate change adaptation (CCA), climate risk management (CRM) and disaster risk reduction (DRR).

As such, it is primarily designed for CCA and DRR practitioners in national governments, local level authorities dealing with DRR/CCA, professional community and development organizations (including UNDP Country Offices and projects) involved in the planning, design and/or implementation of CCA and DRR projects. Thus, the Guide aims to improve the quality of CCA and DRR project development and implementation through enhanced initiation, targeting and increased effectiveness of future interventions.

This guide should be taken only as an outline and a proposal that can assist project managers -DRR and CCA practitioners in developing social vulnerability studies dealing with climate change and disasters in specific countries.

[3] UNDP and Climate Change: Zero Carbon, Sustainable Development

OVERVIEW OF SOCIAL VULNERABILITY ASSESSMENT METHODOLOGIES AND TOOLS USED GLOBALLY

There are numerous operational definitions of social vulnerability to natural hazards, but it is most commonly defined as "the differential capacity of groups and individuals to deal with hazards, based on their positions within physical and social worlds" (Dow, 1992), or as "the inability to take effective measures to insure against losses" (Bogard, 1989).

These differential capacities of groups and individuals are related to control over resources (or endowment with capital), risk exposure, awareness and management, and the ability to respond. Resources form the basis of an individual's or community's ability to be resilient. Diverse and abundant capitals reduce community vulnerability and exposure to risks—i.e. forests can increase protection from storms and floods, while a vibrant local economy can provide the necessary resources to cope when disaster strikes (or to invest in disaster prevention measures, such as river bank reinforcement). In addition, capitals are necessary for risk management and the ability to respond - education increases the skills and knowledge to understand community risks and increases the ability to develop and implement risk reduction strategies, while social capital facilitates coordination and cooperation so necessary for rapid response.

Different communities and individuals are exposed to different risks of hazard, even within the same district or locality. For instance, many Roma communities live on the outskirts of towns, which may be more prone to flooding. Such exposure is not necessarily linked to the socioeconomic status of a community. However, in combination with access to resources and information, as well as visibility on the policymakers' radar screen and ability to influence decision making, it can lead to different abilities to respond.

Risk awareness and preparedness are the key elements for strengthening resilience, as they anticipate the potential impact of hazards. However, there are significant differences in the levels of awareness and preparedness of different groups and individuals. The reasons for these differences are multiple, but three stand out as the most important. The first regards different degrees of access to information, due both to the inaccessibility of information sources and lack of technologies. The second concerns the lack of skills and knowledge for preparedness planning. Last but not least, the third regards lack of resources for preparedness and response measures. This also includes human and social capital and the ability to mobilize people to respond when crisis strikes.

It is impossible to directly measure social vulnerability because it includes so many aspects, described above, some of which (like the ability to mobilize the community) become visible only after a disaster happened. Like in many similar cases, we have to rely on measuring individual characteristics[4] related to social vulnerability, which put people in a less vulnerable position (such as their socioeconomic status or social connections) or a more vulnerable position (disabilities or the community's limited transport connectivity). When it comes to measuring social vulnerability, Cutter, Boruff and Shirley (2003) departed from the following broad groups of (often interplaying) characteristics of positions within physical and social worlds, assumed to be related to vulnerability/resilience:

[4] It needs to be noted that many of these characteristics can be highly contextual.

1. Socioeconomic status (e.g. high-status groups should be more resilient to natural hazards and can recover more quickly),
2. Gender (e.g. women are likely to be more vulnerable due to family-care obligations and lower labor market position),
3. Race and ethnicity (e.g. language barriers that lead to lower resilience, especially when it comes to post-disaster funds),
4. Age (e.g. mobility concerns leading to lower resilience),
5. Commercial and industrial development (e.g. the value, quality and density of commercial and industrial buildings show the economic vitality of a community),
6. Employment loss (higher unemployment levels lead to additional pressure on the labor market in the post-disaster period),
7. Rural/urban (e.g. rural communities are more vulnerable economically due to single-resource economy, but urban communities are more vulnerable to evacuation problems),
8. Residential property (e.g. better-quality residential buildings lead to higher resilience),
9. Infrastructure and lifelines (e.g. loss of communications, such as bridges and transportation infrastructure, can result in a financial burden),
10. Renters[5] (a higher number of renters can lead to lower resilience),
11. Occupation (e.g. some occupations, such as agriculture and other natural resource-based occupations, can be more impacted by a hazard),
12. Family structure (e.g. resilience can be lower in families with large numbers of dependents and single-parent families),
13. Education (higher education is linked to higher income and greater access to information),
14. Population growth (rapid population growth can lead to greater vulnerability due to lack of quality housing and urban systems),
15. Medical services (e.g. greater numbers of medical personnel and proximity to medical services lead to better resilience),
16. Social dependence (e.g. people relying on social services constitute vulnerable groups that may need additional assistance), and
17. Special needs population (e.g., institutionalized persons, homeless persons who can be more severely affected due to lack of access to information or lower visibility).

[5] Persons who rent a house/apartment.

These variables can be divided into two groups based on the data collection level. The first group consists of individual level variables (for example, education, age and gender) that are aggregated to produce community-level numbers.

The second group comprises community-level variables, such as population growth, infrastructure quality and urban/rural division that need not be aggregated. By conducting a principal component analysis with normalized variables, these authors extracted eleven composite factors and used them to calculate the Social Vulnerability Index (SoVI) of US counties, without assigning weights to the factors. The Social Vulnerability Index was further developed by the Hazards and Vulnerability Research Institute at the University of South Carolina[6] .

Similarly, Oulahen et al. (2015) used the following five groups of indicators to calculate social vulnerability to floods in the City of Vancouver:

1. Ability to cope (age, gender), ethnicity (minority status, immigration),
2. Access to resources (income, property value, percentage of renters, education, unemployment, income from government transfers),
3. Household arrangement (single-parent households, single-member households),
4. Public transport (as the main family transportation mode), and
5. Built environment (quality of housing, age of construction, population density, dwelling in 5+ stories apartments).

The authors also used the principal component analysis to extract the component factors and create an additive model[7] of the Social Vulnerability Index, a flexible tool appropriate for modelling multivariate data.

The areas were classified according to the standard deviation (SD) from the mean. The vulnerability scores/areas were classified into five categories (quintiles): high (>1.5SD), medium-high (0.5 to 1.5SD), medium (–0.5 to 0.5SD), medium-low (–1.5 to 0.5SD) and low (<–1.5SD).

The Index (SoVI) was validated through focus groups with local practitioners working on the development of natural hazard plans in the local municipalities. The practitioners were asked to indicate whether indexes/area maps corresponded to the local reality when it came to flood hazards.

[6] The list of variables that comprise the Index can be found on the Institute's website (http://artsandsciences.sc.edu/geog/hvri/sovi%C2%AE-0), together with detailed methodological explanations.
[7] https://en.wikipedia.org/wiki/Additive_model

Park et al. (2016) constructed a socio-economic vulnerability index that is specific to landslide hazards. They used the following three sub-indexes relating to different issues of vulnerability/disaster risk:

1. Demographic and social index (age distribution; number of workers who may be exposed to disasters, population density, foreigner ratio, education level, housing type),
2. Secondary damage triggering index (number of public offices, road area ratio, number of electronic supply facilities, school area ratio, commercial and industrial area ratio), and
3. Preparation and response index (disasters frequency, Internet penetration rate, number of disaster prevention facilities, perceived safety, number of medical doctors, and financial independence of the borough). The authors assigned weights to the sub-indexes, as well to the variables that comprise sub-indexes, through interviews with the key informants.

In their research in Norway, Holand, Lujala and Rød (2011) also used the basic methodological approach delineated in Cutter, Boruff and Shirley (2003). They, however, consider "the social vulnerability concept to consist of two distinct parts: socioeconomic vulnerability characterized by aspects such as living conditions and population structure; and built environment vulnerability, measured by factors such as population density, the quality and magnitude of infrastructure, and the number of exit routes." Principal factor analysis revealed a four-factor solution when it comes to the Socio-Economic Vulnerability Index (SEVI) and a three-factor solution when it comes to the Built Environment Index (BEVI).

Even though most studies use unweighted indexes of social vulnerability to hazards, Oulahen et al. (2015) point out the necessity of variable weighting, preferably by using the knowledge and experience of the local stakeholders. For example, Emrich (2005) used the Delphi method with local experts in order to assign variable weights.

CCA/DRR SOCIAL VULNERABILITY CASE STUDIES

STUDY	LOCATION	DATA COLLECTION METHODS	SHORT EXPLANATION OF METHODOLOGY
Comparable Social Vulnerability Profiling – CSVP (Case study: Croatia)	Croatia, 2015	Census 2011, Croatian Bureau of Statistics	The calculation of six equally valued variables/indicators (without ponders) for several Croatian cities, municipalities and counties was followed by their comparative analysis. The final step involved comparing the vulnerability tables against the common denominator - either the county or the state.
Economic and social vulnerability in Georgia	Georgia, 2013	Household Budget Survey by GEOSTAT on regular sample + 500 households from each target group. In-depth interviews and focus groups discussions with representatives from these 3 target groups	The regular HBS questionnaire was supplemented by a special module on vulnerability. A qualitative analysis was implemented at the beginning of the research, involving in-depth interviews with the key stakeholders, in order to design the appropriate special module and another qualitative analysis was performed after the initial analysis of the survey results, through focus groups comprising participants from the three target groups.
Disaster Risk Reduction and Climate Change	The former Yugoslav Republic of Macedonia (South-East Region), 2013	2002 National census	After collecting useful data about the South-East Region, a set of indicators and indexes of socioeconomic vulnerability was designed in accordance with the national policies and strategies. The team then constructed an index of vulnerability based on the existing theoretical models.

STUDY	LOCATION	DATA COLLECTION METHODS	SHORT EXPLANATION OF METHODOLOGY
Socio-Economic Assessment of Flood Risk in Rioni Basin	Georgia (Rioni Basin), 2014	Flood risk scoring in a form of Multi Criteria Analysis (MCA)	Flood risk screening and quantification by social, agricultural and environmental drivers in communities or municipalities in order to indicate the riskiest areas in the region. The next step involved the identification and estimate of economic damages.
Guidance on Ecosystem Considerations into Climate Change Vulnerability and Impact Assessment to Inform Ecosystem-based Adaptation	Nepal, Peru and Uganda, 2015	Several methodologies, such as CARE's CVCA, PROVIA guidance. No data collection from primary sources.	The CVCA (Climate Vulnerability Capacity Assessment) methodology of vulnerability and adaptive capacity was used to analyze the communities, households and individuals, i.e. at the local level. The PROVIA model was used for larger-scale assessments.
Testing of Climate Risk Assessment Methodology	Kyrgyzstan, 2013	Focus groups (each with eight participants) and house interviews (54 persons). Comparative analysis of the experts' and respondents' opinions	The respondents were asked about their perceptions of changes in the frequency of climate-related hazards (avalanches, prolonged winter, livestock diseases, landslides, etc.) and indications of climate change (more frequent snowfalls, heavy rains, etc.). A comparative analysis identified some differences in opinion on these issues among the experts and the local population.

Table 1. CCA/DRR Social Vulnerability Assessment case studies implemented by UNDP

The examples in the above Table 1 show that social vulnerability and other types of vulnerability of some specific groups were calculated only on the basis of official census data and other secondary sources. In the Croatian case study, there were no respondents at all – social vulnerability was measured only based on the data from the last census. Arguably, the most detailed SVA study was conducted in Georgia where GEOSTAT's Household Budget Survey (HBS) was expanded to include a special module (in fact, a set of specific questions) that measured vulnerability.

The key stakeholders were interviewed before the Survey in order to design the most appropriate module. After the analysis of the HBS primary results covering the three target groups, interviews were held with the focus groups to clarify specific issues. The main issue arising with respect to the former Yugoslav Republic of Macedonia study is that it used the data from the latest available national census (11 years old), which were thus probably outdated. The case study that included three countries on three different continents - Nepal, Peru and Uganda - employed different concepts (such as CARE, PROVIA, etc.) in order to understand social vulnerability at the local and larger-scale levels, but did not use any primary data obtained from surveys, interviews, focus-groups or by other methods.

As noted, these quantitative approaches to measuring social vulnerability are based on assumptions and models, and on simplification of a complex reality. In reality, we do not face "known knows" and a deterministic relationship, but rather "known unknowns" and "unknown unknowns", or complicated and complex domains in terms of the Cynefin Framework[8]. Complicated problems may contain multiple right answers, and, although there is a clear relationship between cause and effect, not everyone can see it. In general, good practice, as opposed to best practice, is more appropriate for problems in the complicated domain.

For instance, information for risk awareness can be provided through different channels - TV, radio, newspapers, social networks, by word of mouth, etc. - which can have different capacity to reach different groups and which are perceived differently. In case of complex problems, cause-and-effect relationships are not discernible in real time, only retrospectively. Trying to solve a complex problem by best practices or good practices results in it returning in a different form; however, surprisingly simple solutions emerge to complex problems.

This calls for using qualitative methods to complement quantitative studies. For instance, UNDP successfully employed the micro-narratives technique[9] in a number of cases, ranging from Green Economy in Belarus to Women's Entrepreneurship in Tajikistan[10] and Roma poverty from a human development perspective (UNDP BRC, 2011)[11]. Essentially, the approach involves collecting stories (narratives) and asking the respondents to tag them according to a number of criteria. This can help better understand the meaning of vulnerability criteria.

The approach can also be used for identifying solutions by asking the following question: "How do we create more stories like this one and fewer stories like that one?" For instance, in the case of Tajikistan, we found out that the major obstacle for women's entrepreneurship lay in their lack of self-confidence, not in high interest rates (as many had suggested). In case of Belarus, we found out that the Government information campaign had zero effect on behavior change, while examples of neighbors had huge impact.

Overview of the previous research indicates that there is a wide range of indicators that are being used in social vulnerability analyses. However, the methods for calculating the social vulnerability indexes are relatively similar in most situations.

[8] Cynefin Framework Introduction, available at http://cognitive-edge.com/videos/cynefin-framework-introduction/

[9] http://cognitive-edge.com/sensemaker/#sensemaker-cases

[10] https://www.unpei.org/sites/default/files/e_library_documents/Women%20Empowerment%20in%20Tajikistan_0.pdf

[11] http://www.eurasia.undp.org/content/rbec/en/home/library/roma/roma-poverty-human-development-perspective.html.

INTRODUCTION

A study of social vulnerability should develop a valid and reliable list of indicators and measure them in order to classify geographic units of various sizes and levels according to their vulnerability to the specific natural hazards or climate risks. Different sets of indicators should be applied to different types of natural hazards (for example floods, earthquakes, landslides, droughts, etc.) in situations where it is deemed that social vulnerability to these hazards is different in specific cases.

However, the same sets of indicators can be applied to the geographic units regardless of their size (e.g., local self-government units of different levels) by aggregating the values of the social vulnerability indicators. At the end, the study should produce a map with the classification of geographic units according to their level of social vulnerability.

- Putting in place / agreeing on a conceptual framework for measurement
- Indicator development
- Index calculation and application
- Index validation
- Index use

These stages are shown in Figure 1 below

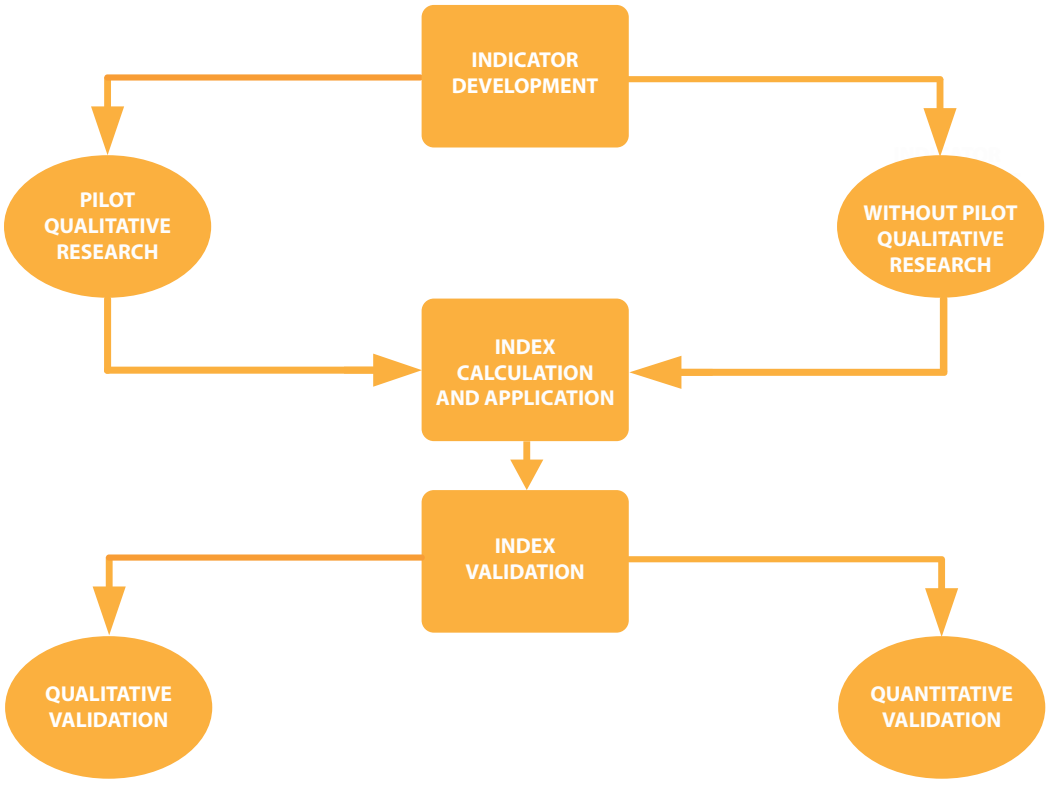


Figure 1. Outline of the SVA study

DEVELOPMENT OF INDICATORS

In this stage of the study, a preliminary list of indicators suited to the local context and data availability should be developed. The starting point should be the list of indicators comprised by the so-called Social Vulnerability Index – SoVI[12] . For example, this Index was used in the UNDP study on disaster risks and climate change in the former Yugoslav Republic of Macedonia, with indicators selected after a comprehensive review of the country's legislation, national and regional policies and strategies and academic literature on the issue. However, this Index should probably be extended to include items related to social networks, and other possible aspects of social vulnerability not present in the Index.

The preliminary list of indicators can be developed with or without performing a pilot qualitative study. The simplest way would involve desk research, wherein researchers would develop the list based on prior studies, as well as theoretical and practical knowledge. However, a desk research does not fully ensure that the list will be valid and well-suited to local circumstances.

Thus, several types of qualitative analysis (in-depth interviews, Delphi method, focus groups) with the key informants (local experts and stakeholders), i.e. a pilot qualitative study, can be performed in order to produce the preliminary list of indicators to be used in the subsequent phases of the study. It is very important to note here that the list of indicators should be developed having in mind the local availability of data, and possibilities to repeat the research in the future. Namely, only indicators that are available for geographic units and can be expected to be available in the future should be included.

It should be mentioned that indicators can have different meanings at the individual, community, regional and country levels. Moreover, tools available for data collection can have certain limitations related to the level of disaggregation. For instance, GDP per capita is a good indicator of the quality of life or human development opportunities. Spatially disaggregated GDP data, estimated by using the production method, measure the gross value added generated in a specific territory and its sources – but not necessarily its purpose (on what the income has been spent).

Because sub-national jurisdictions may benefit from large inter-regional transfers by the central government (which are not reflected in sub-national gross value added data and the GDP estimates based on the production method), sub-national per capita GDP data can be poor measures of sub-national living standards and development prospects. GDP data are typically available at the regional level, but not at the provincial or municipal levels.

Household surveys are an important tool for collecting various social vulnerability data (for instance, such a survey was used in the Georgia Social Vulnerability Study), but they also have their limitations. In most cases, household surveys operate at the level of households, not individuals, hence income and expenditures are average for all household members and mask intra-household inequalities. Because of their design, these surveys are representative at the country level.

[12] Susan L. Cutter; Bryan J. Boruff; W. Lynn Shirley, "Social Vulnerability to Environmental Hazards," Social Science Quarterly, Volume 84, Number 2, June 2003, pp. 242-261)

Last but not least, non-linearity and feedback loops should be borne in mind during the selection of the indicators. For instance, in Serbia, the number of NGOs per 1,000 inhabitants (proxy of civic engagement) was the highest in the most deprived municipalities. In other words, NGOs most probably have to step in where the Government fails to deliver services. In a similar vein, we found[13] the highest level of social exclusion in Serbian municipalities with the highest and lowest voter turnouts.

In Uzbekistan, the share of women in higher education (a proxy for gender equality) is the highest in the deprived region of Karakalpakstan, and the lowest in Tashkent, reflecting the structure of the education system - girl-dominated medical and pedagogical universities in Karakalpakstan and a mixture of institutions in Tashkent.Therefore, the initial list of indicators, once prepared, needs to be reviewed by asking the following questions: What does this indicator mean at the local level and can I get it? How it is related to vulnerability? Why?

In this process, weights can also be assigned to the variables in case that some variables are deemed more important than others. For example, this approach was taken in the UNDP study of social vulnerability in Georgia, where a combination of quantitative data (Household Budget Survey by GEOSTAT extended to 500 additional households in each target group) and qualitative data (focus groups and in-depth interviews with representatives) was used. In that case, the results of the focus groups and interviews helped design the set of indicators and their weights.

The choice of a particular qualitative research method will depend on the assessment of its strengths and weaknesses in each particular case. For example, in-depth interviews require more time, but they provide in-depth knowledge of the research topic. Focus groups take less time and can generate more ideas using group dynamics. However, they can generate biased results due to group thinking and domination of high-status individuals. The Delphi method avoids this bias, but at the cost of losing the group dynamics.

Furthermore, in line with guidelines developed by Bergstrand et al. (2015), it would be desirable to enlarge the concept of community resilience to natural hazards with social capital variables. Some examples of such variables include a sense of community, attachment to a place, sense of social support, civic participation, size of one's personal social network, etc. The amount of a community's social capital should be positively correlated to community resilience by providing a safety net that can help individuals cope with the disaster and recover from it more quickly.

Several indicators of social vulnerability with their expected influence on social vulnerability are listed in the following Table 2 based on previous research and models. However, it should be noted that the actual influence is context-dependent, i.e. that it should be assessed in every individual study. Additionally, the list should not be taken as an exhaustive list of all possible indicators, but merely as a list of examples intended to improve understanding of the matter.

[13] Supra 2

SOCIAL VULNERABILITY INDICATORS

GROUP	INDICATORS	EXPECTED INFLUENCE ↑ increases social vulnerability ↓ decreases social vulnerability
Socioeconomic	GDP per capita	↓
	Average monthly salary	↓
	Unemployment level	↑
	Number of socially dependent individuals/citizen	↑
	Occupation (profession and managerial level)	
	Occupation – open space (e.g., agriculture, construction)	↑
	Economic sector (e.g., resource extraction)	↑
Demographics	Age (proportion of youth and elderly population)	↑
	Gender (female)	↑
	Education	↓
	Special needs/disability population	↑
	Vulnerable minorities	↑
	Immigrants	↑
	Rapid population growth	↑
Family structure	Single-parent households	↑
	Single-member households	↑
	Large families	↑

GROUP	INDICATORS	EXPECTED INFLUENCE ↑ increases social vulnerability ↓ decreases social vulnerability
Medical services	Number of medical personnel per capita	↓
	Number of hospitals per capita	↓
	Average distance from nearest hospital	↑
Urban	Percentage of urban population	↑↓
Renters	Percentage of renters	↑
Built environment vulnerability	Population density	↑
	Quality of infrastructure	↓
	Age of infrastructure	↑
	Average property value	↓
Social capital	Sense of community	↓
	Attachment to a place	↓
	Perceived level of social support	↓
	Civic participation	↓

Table 2. List of Examples of Social Vulnerability Indicators

Source: Adapted from Cutter, S.L.; Boruff, B.J.; Shirley, W.L. (2003); Holand, I.S.; Lujala, P.; Rød, J.K. (2011); Holand, I.S.; Lujala, P. (2013); Bergstrand, Kelly; Mayer, Brian; Brumback, Babette, Zhang, Yi (2015).

Particular indicators can be presented at several hierarchy levels. For example, in the figure below, taken from UNDP study in Georgia, we can see how household resources (characteristics) can be analysed on some domain levels with sub-domains and content indicators groups. For example, domain "Human resources" can be measured through sub-domains "Education" (with "Educational attainment" and "Quality of education" as content indicators), "Labor" and "Health".

DOMAIN	SUB-DOMAIN	CONTENT INDICATORS
Material resources	Financial resources	Income
		Savings
		Debts
		Type of income
	Physical resources	Land
		Livestock
		House/apartment
		Durable goods
		Quality of housing
Human resources	Education	Educational attainment
		Quality of education
	Labor	Employment
		Type of employment
	Health	Health status
		Chronic illness
Social resources	Social network	Size
		Status
		Connection
	Information & communication	Source of information
		Means of communication
	Community	Presence of associations
		Variety of associations

Table 3. Characteristics of household resources

Source: Gassmann, Berulava, Tokmazishvili et all. Economic and social vulnerability in Georgia

SOCIAL VULNERABILITY INDICATORS

An example of the list of indicators with their definitions and data sources that have been used in UNDP study in the City of Skopje is shown in the Table 4 below. This case provides an example of the specification of social vulnerability indicators according to their importance in a particular context and availability of data sources. For example, the percentage of Roma population as a vulnerable minority was identified as an indicator that increases social vulnerability.

	CHARACTERISTICS INDICATOR	INPUT DATA AND THEIR SOURCE	HIGHER VALUES OF INDICATORS CONTRIBUTE TO
DEMOGRAPHIC CHARACTERISTICS			
1	Rapid population growth: Average annual rate of population growth in the municipality	The former Yugoslav Republic of Macedonia Statistical Office biannual population estimates by municipality and authors' estimates for some of the Skopje municipalities	Increased social vulnerability
2	Young population: % share of the population on age under 6 years in the total population of the municipality		Increased social vulnerability
3	Elderly population: % share of the population on age 65 years and plus in the total population of the municipality		Increased social vulnerability
4	Ethnicity: % share of the Roma population in the total population of the municipality	The former Yugoslav Republic of Macedonia 2002 Population and Housing Census	Increased social vulnerability
5	Special needs population: % share of the population with disabilities in the total population of the municipality	Administrative data, Ministry for labor and social policy	Increased social vulnerability
ECONOMIC			
6	Employment: number of registered unemployed persons (active and passive job seekers) per 100 persons of working age (15-64)	Administrative data, The former Yugoslav Republic of Macedonia National Employment Agency	Increased social vulnerability

	CHARACTERISTICS INDICATOR	INPUT DATA AND THEIR SOURCE	HIGHER VALUES OF INDICATORS CONTRIBUTE TO
LIVING CONDITIONS			
7	Housing conditions, water supply system: % of households with piped water from a community scheme	Authors' estimates based on data on registered users from the public water supply and sewage company, data from the 2002 Population and Housing Census and information published on municipal web portals and in their Environmental Local Action Plans	Reduction of the social vulnerability
8	Housing conditions, sewage disposal system: % of households with a piped system connected to a public sewage disposal system		Reduction of the social vulnerability
9	Living environment, access to medical services: doctors-physicians, number of general practitioners per 10,000 residents	Administrative data from the Public Health Institute Center for Public Health - Skopje	Reduction of the social vulnerability

Table 4. List of Indicators Including Their Definitions and Data Sources

Source: Socio-Economic Vulnerability Assessment of the Population in the Ten Municipalities of the City of Skopje in relation with Disaster Risks and Climate Change (National Consultant: MSc Katerina Kostadinova-Daskalovska).

Since the indicators of social vulnerability are highly country-specific, it is recommended that SVA process engage local experts to participate in the qualitative research. Thus, the development of indicators should include desk research, qualitative research involving local experts and a population survey (as feasible).

Another example is from the Croatian study. In order to determine the vulnerability levels of the respective communities (municipalities/cities) within one area (at the county or national level), all the results derived from the respective vulnerability assessments were compared with the common denominator – in this particular case, seven respective communities (villages, municipalities, cities) were compared with the higher level territorial unit i.e. a county. Similarly, all the counties can be compared at the national level i.e. at the country/state level.

CSVP COMPARABILITY TABLE COMMUNITIES 1-7									
CSV PROFILE	AGE (V)	GENDER (V)	EDUCATION (V)	MINORITY (V)	INCOME (V)	DISSABILITY (V)	RESULT		CSVP
Community 1	+	+	+	+	+	+	0	+6	H
Community 2	-	+	+	+	+	+	-1	+5	H
Community 3	-	-	+	+	+	+	-2	+4	M
Community 4	-	-	-	+	+	+	-3	+3	M
Community 5	-	-	-	-	+	+	-4	+2	M
Community 6	-	-	-	-	-	+	-5	+1	L
Community 7	-	-	-	-	-	-	-6	0	L

Table 5. Values of Vulnerability Indicators

Source: Comparable Social Vulnerability Profiling – CSVP Case Study: Croatia (2015)

Comparable Social Vulnerability Profiling (CSVP) tested in Croatia in fact presents a very simplified and user friendly method that can be implemented even at the local level without the need for expert support wherefore it basically provides a foundation for future project planning (see Annex 4 for more details on the methodology).

Therefore, the CSVP methodology relies on the following two important pillars: **data simplicity and comparability.** The aim of the method is to present a systematic and logical process to determine vulnerability data disaggregation, which is easily understandable and essentially of a rather simplified nature, meaning that no weighting was added to the indicators.

In order to address the problem of vulnerability data that were scattered, inconsistent and in need of systematization, the CSVP opted to use the census data as they are collected systematically and then professionally analyzed by the Croatian Bureau of Statistics.

Furthermore, these data are temporally consistent (the Census is conducted every ten years), easy to use and in that sense, fully adaptable to the needs of this social vulnerability methodology. Furthermore, census based data collection/analysis has to be: a) related to some sort of geographic scale (level of municipality/city/county) sufficient to identify demographic differences determining the location of vulnerable population groups; and b) flexible and, most importantly, applicable in different phases of the disaster cycle and different event types, depending on how the readily accessible components best fit the user's needs.

Still, the use of such census based data (in this case CSVP) may have some limitations. One of the limitations is the rapidly changing composition of an area in the past few years. This can be caused by rapid and large-scale migration or triggered by population relocation due to extreme natural disasters. In that context, the census data, having a 10-year temporal span, can be considered outdated.

Another problem arising from the use of census data is that the census firstly registers the people's permanent residence and not their temporary residence. Secondly, the census registers the people by where they live, not necessarily by where they work so that the question of commuters also presents a limitation in the process. However, as already noted, even though it understood census data limitations, the CSVP opted to use census data since it had no other option and the data served the purpose.

INDEX CALCULATION AND APPLICATION

In this phase of the SVA, primary data (in most cases collected through surveys) and secondary data (in most cases these would be the census data or other data collected by the public administration) are collected. F2F/ field surveys (CAPI or paper-pencil), telephone surveys (CATI), or web-based (online) surveys can be used as a data collection method.

The choice of the particular data collection method will depend on the available budget (field surveys being the most expensive and online surveys the least expensive in most cases), time constraints (field surveys being the most time-consuming) and sampling issues (phone connection coverage, Internet connection coverage). Whichever is chosen, it is preferable to use automated methods of data entry based on online platforms.

For example, in case of field surveys, it would be preferable to use laptops or tablets with a wireless connection in order to be able to directly enter the collected data into a database. Similarly, a telephone survey should preferably involve direct data entry (computer-assisted telephone interviewing).

All variables should be defined at the highest possible measurement level. For example, the interval measurement level should be used whenever possible, i.e. variable levels should be collapsed into classes only when necessary (when a variable is of an ordinal nature, or when some data are deemed personal by the respondents). If response classes (ordinal variables) are used, the number of classes should be as high as possible (i.e., the data should be as precise as possible) in order to be able to proceed with a meaningful quantitative analysis (principal component analysis).

For instance, if age categories (classes) are used, they should be as wide as possible. The variables should be standardized (e.g., z-values) and subjected to the principal component analysis in order to check their dimensionality and avoid redundancy, and to produce the composite social vulnerability index score for every geographic unit.

Geographic units can be divided into several groups (e.g., low-risk, medium-risk, high-risk) depending on the value of the index. Comparability across the studies can be ensured by using percentiles as cut-off lines. For example, low-risk units can be classified as those below the 20th percentile, medium- risk units as those between the 20th and 80th percentiles, and high-risk units as those scoring at the 80th percentile or more.

When conducting the principal component analysis, it is customary to select factors with Eigenvalues higher than one, to exclude outliers (e.g., z-values larger than five), and to substitute the means of the variables for the missing values. Additionally, the factor solution can be validated through use of scree plots and/or parallel analysis.

The extracted factors should be rotated using orthogonal rotation, such as Varimax rotation. After the final factor solution, scores are calculated, indicating the level of social vulnerability of a geographic unit at issue. The factors need to be theoretically interpreted before adding factor scores in order to produce the composite index of social vulnerability.

Namely, the results/number of points of factors increasing social vulnerability should be given plus signs, and the results/number of points of factors decreasing social vulnerability should be given minus signs. It also needs to be noted that the number of geographic units should be sufficiently high to enable the implementation of a meaningful and reliable principal component analysis. As a rule of thumb, the ratio of sample size (number of units) and number of variables should be at least 5-10 (Cattell, 1978; Everitt, 1975).

As per mapping the results of a social vulnerability study, different tools and approaches can be used, depending on their availability and the preferences of the authors of the study. For example, the simplest method of map development that can be used for the project preparation phase is in fact the use of image editing software (e.g., MS Paint) or any other free or licensed software tools.

For example, an online map-making tool Mapchart.net provides the possibility of subdividing a country into administrative units of different levels and painting them in different colors (the background and the border colors of the map can also be changed). The created map can be saved as an image and used in research reports. Similar opportunities are provided by National Geographic Interactive, Scribble Maps, and other tools[14].

There are also some other inexpensive, web based and open source GIS tools that can support geospatial analysis of social vulnerability data and plotting data points of maps, such as R map-making packages and free DevInfo. More experienced users can opt for the ArcGIS and/or GRASS GIS tools, but the most important thing to note is that, no matter which map-making tool one chooses, it is in fact all about creating, manipulating and visualizing the collected social vulnerability data, or, for that matter, any other data in a map.

No matter which GIS model is used, it is envisaged that social vulnerability visualization will be supported by the provision of relevant geospatial information and its connection to the respective vulnerability indicators. GIS data presented in such a manner can furthermore provide pointers for structured DRR/CCA reduction prevention and preparedness planning and adequate disaster response.

The choice of the appropriate data collection method should be based on local circumstances, budget constraints, and project goals.

[14] For examples of social vulnerability mapping, see Annex 2.

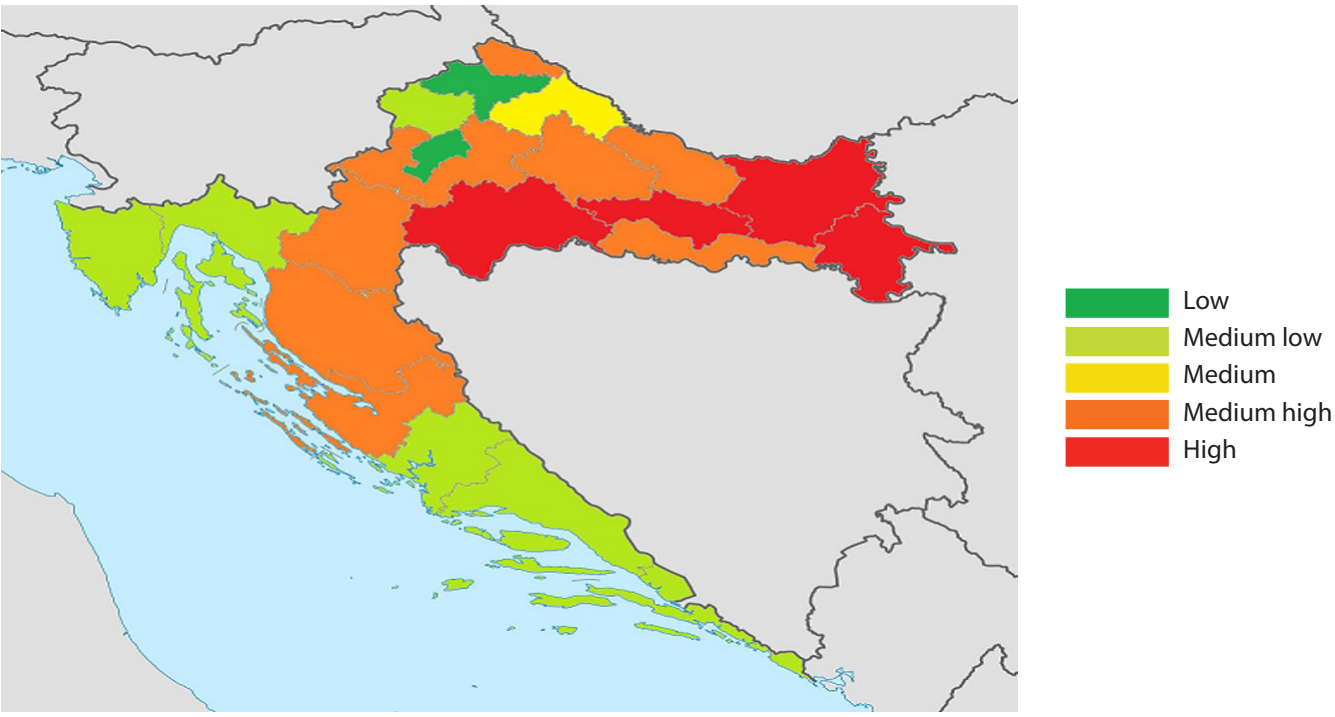


Figure 2. Example of Social Vulnerability Index Mapping Created by MS Paint (CSVP Croatia)

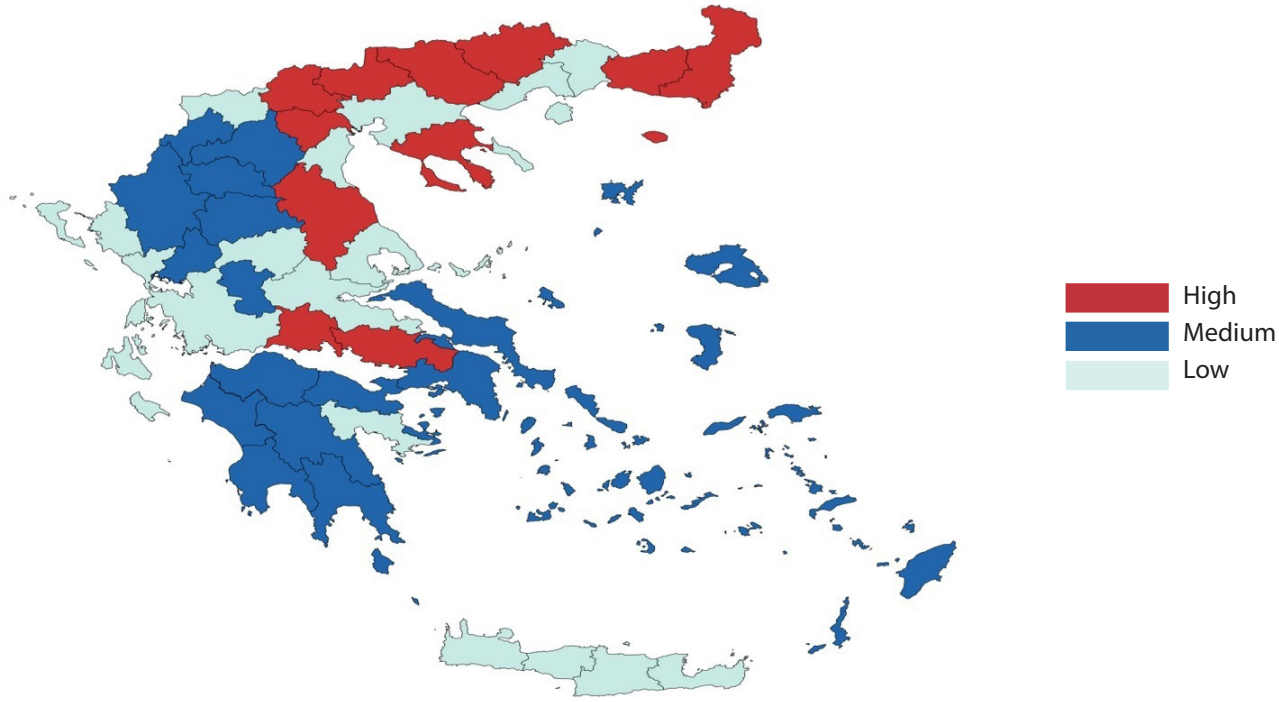


Figure 3. Example of SV Index Mapping Created by Mapchart.net (Fictional Results)

INDEX VALIDATION

In this stage of the study, the validity of the index will be checked. This can be done in two ways. One involves qualitative research (in-depth interviews, Delphi method, focus groups) with the key informants (local experts and stakeholders) who will check the value of the index for the geographic units from their own perspective.

The selection of the qualitative method will have to take into account the same considerations as the ones borne in mind during the development of the preliminary list of indicators. Validity can also be checked by calculating correlation with the number of disaster declarations in the geographic unit, or another measure of disaster frequency and severity, if available. After validation, the final list of indicators and final index scores will be calculated.

INDEX CALCULATED. WHAT NEXT?

An index calculation disaggregation exercise should serve a well-defined purpose. The primary question to answer is Why are we doing it? One major reason is (or can be) to provide better inputs into local policy making. For that purpose, however, the index should be consistent in terms of inputs, outputs, and outcomes (and ideally impact) - what exactly are we measuring?

It should be clearly understood (and communicated) in vulnerability debates that the index is the starting point, not the end. The calculation of the index only makes sense if it is linked to a broader set of disaggregated indicators for a more in-depth analysis and better argumentation of the underpinning assumptions, or linked to qualitative tools, which help identify and test the solutions. The contextual linkages will then become clearer and the information the index components provide (for example how a certain municipality or group of people has reached its (non-)vulnerability level, where it lags behind, etc.) will be relevant from the policy and practice perspectives.

The index can be used for a number of mutually non-exclusive purposes, including comparison, diagnostics, and monitoring. The Buffalo Regional Institute's Resilience Capacity Index (RCI)[15] is an example of using the index for comparison. RCI is a single statistic summarizing a region's status on twelve factors hypothesized to influence the ability of a region to bounce back from a future unknown stress. The index permits comparisons across metropolitan regions and identification of strong and weak conditions relative to other metropolitan regions.

The ARUP/Rockefeller Foundation's City Resilience Index[16] is an example of using the index as a diagnostic tool, which gives cities a tool to understand their resilience, and shape urban planning, practice and investment. Each city's resilience profile is generated by assessing its current state against 12 goals and 52 indicators. This provides a holistic overview of a city's resilience across four key dimensions: People, Organization, Place, and Knowledge. Index can be used for monitoring through repeating calculations.

[15] http://brr.berkeley.edu/rci/
[16] http://www.cityresilienceindex.org/

CONCLUSIONS AND RECOMMENDATIONS

Disaster statistics in the past twenty years show a higher percentage of women, children and other socially vulnerable groups among disaster victims. There is no question that socially vulnerable people are more exposed to and affected by the impacts of climate change and disasters. For that reason, recognition and understanding of the social vulnerability of various groups at the local, regional and country levels can significantly reduce damages and losses and provide the most appropriate interventions for adaptations and risk management.

Social vulnerability is most commonly defined as "the differential capacity of groups and individuals to deal with hazards, based on their positions within physical and social worlds" (Dow, 1992), or as "the inability to take effective measures to insure against losses" (Bogard, 1989).

Although there are dozens of social vulnerability methodologies used worldwide, they are not systematically integrated into the overall process of climate and disaster risk management. There are a number of methodological issues in defining and mapping the socially vulnerable population among the overall population.

Almost all SVA methodologies use parameters, such as household income, gender, age, disability, language, literacy or family status, but still there is a significant problem with data availability (i.e. census, pre- and post-disaster studies, public surveys, etc.). In many countries or their regions, the data do not exist, are outdated or of poor quality. Some of the social vulnerability parameters, such as level of education, age, gender etc., are collected at the individual level, while others, such as infrastructure quality and urban/rural division, are collected at the community level.

The UNDP pilot projects referred to in this Guide addressed various climate-induced threats and impacts, targeting the most vulnerable communities at the country and provincial levels, and focusing on building resilience and ensuring sustainable development. Some of them used census data (Macedonia, Croatia), some used data obtained through surveys (Kyrgyzstan and Georgia, for example), while others only used the data obtained through screening and quantification of potential risks in a particular area (Rioni Basin in Georgia and the Nepal, Peru and Uganda study).

In conclusion, a study of social vulnerability should provide a valid and reliable list of indicators that can classify geographic units of various sizes and levels by their vulnerability to specific natural hazards. Such a study should comprise the following three main stages: 1) indicator development, 2) index calculation and application, and 3) index validation.

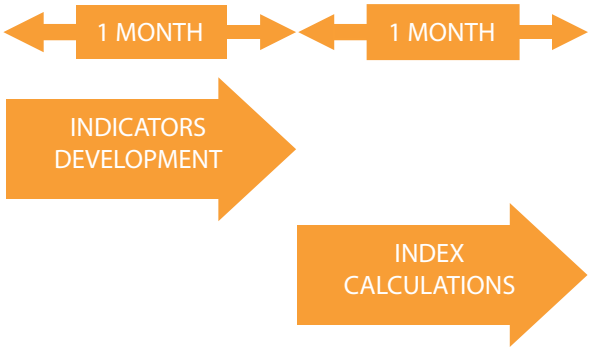
The preliminary list of indicators based on the local context and on the screening of the baseline situation should be developed in the first stage. This can be done by desk research, in-depth interviews, Delphi-method, focus groups, etc. The so-called Social Vulnerability Index (SoVI) can serve as a good starting point.
In the second stage – index calculation and application – the SVA study will take primary data (mainly from surveys) and/or secondary data (in most cases census data or other data collected by the public administration).

The variables used in the study should be standardized and subjected to a principal component analysis in order to check their dimensionality and avoid redundancy. A composite social vulnerability index score for every geographic unit should be produced in result. Geographic units can be divided into several groups (e.g., low-risk, medium-risk, high-risk), depending on the value of the index.

In the third and final stage, a validity check of the index will be carried out either through qualitative research with the key informants (such as local experts and stakeholders), or by calculating correlations with the number of disaster declarations in the geographic unit, or another available measure of disaster frequency and severity. After validation, the final list of indicators and final index scores is to be calculated. The final data should be provided in numerical form, as well as through mapping (i.e. visual representation).

SVA INDICATIVE TIMELINES

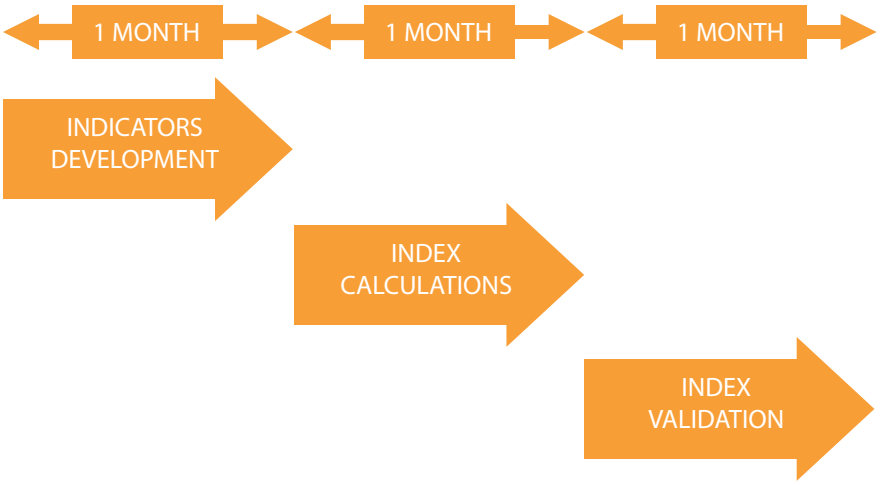
The purpose of this Annex is to present indicative timelines so that UNDP project managers can plan their activities in order to conduct social vulnerability studies. This Annex outlines indicative timelines which are tentative, depend on the country, level of capacity, data availability, type of hazard, etc. It can also be assumed that timelines and study budgets are interdependent.



SIZE	INDICATORS DEVELOPMENT	INDEX CALCULATION	INDEX VALIDATION	TOTAL DURATION
City/municipality	Desk research (1 month)	1 month	-	2 months
County	Desk research (2 months)	1 month	-	3 months
State	Desk research (3 months)	1 month	-	4 months

Figure 4. Indicative Timeline for Conducting a Simplified SVA

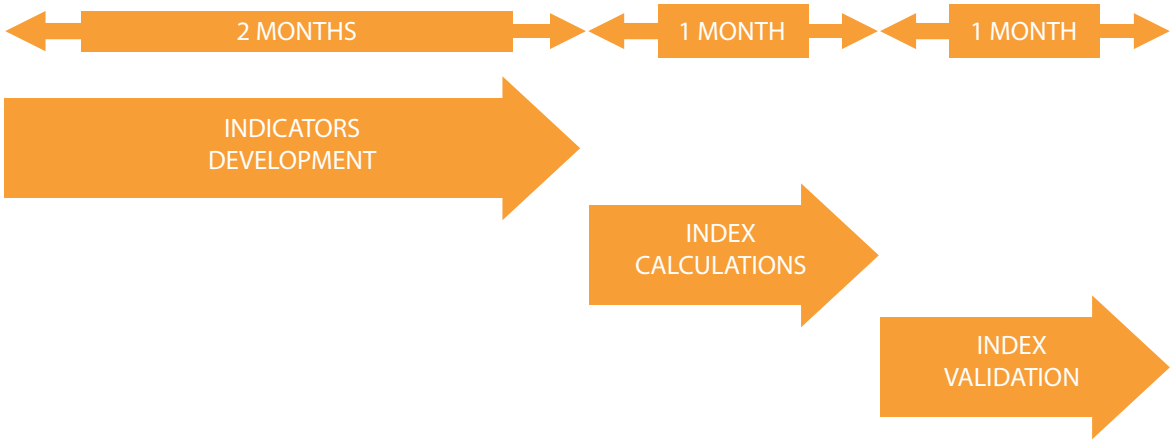
The above Figure 4 presents the most simplified version of a SVA when its implementation does not include qualitative research in Stage 1 (indicator development) and Stage 3 (index validation). The timeline changes and reflects the size of the geographic area (city, state, region) targeted by the SVA.



LEVEL OF RESEARCH	INDICATORS DEVELOPMENT	INDEX CALCULATION	INDEX VALIDATION	TOTAL
City/ municipality	1. Desk research (1 month) 2. In-depth interviews (10 interviews) (1 month) or Focus groups (1 month) or Delphi method (1 month)	1 month	1 month	4 months
County	1. Desk research (2 months) 2. In-depth interviews (10 interviews) (1 month) or Focus groups (1 month) or Delphi method (1 month)	1 month	1 month	5 months
State	1. Desk research (3 months) 2. In-depth interviews (10 interviews) (1 month) or Focus groups (1 month) or Delphi method (1 month)	1 month	1 month	6 months

Figure 5. Indicative Timeline for Conducting a Mid-Level Complexity SVA

The above Figure 5 presents the mid-level complexity version of a SVA, the implementation of which includes qualitative research in Stage 1 (indicator development) and correlational validation in Stage 3 (index validation). The timeline changes and reflects the size of the geographic area (city, state, region) targeted by the SVA.



LEVEL OF RESEARCH	INDICATORS DEVELOPMENT	INDEX CALCULATION	INDEX VALIDATION	TOTAL
City/ municipality	1. Desk research (1 month) 2. In-depth interviews (10 interviews) (1 month) or Focus groups (1 month) or Delphi method (1 month)	1 month	1 month	5 months
County	1. Desk research (2 months) 2. In-depth interviews (10 interviews) (1 month) or Focus groups (1 month) or Delphi method (1 month)	1 month	1 month	6 months
State	1. Desk research (3 months) 2. In-depth interviews (10 interviews) (1 month) or Focus groups (1 month) or Delphi method (1 month)	1 month	1 month	7 months

Figure 6. Indicative Timeline for Conducting a Complex SVA

The above Figure 6 presents the complex version of a SVA, the implementation of which involves qualitative research in Stage 1 (indicator development) and qualitative validation in Stage 3 (index validation). The timeline changes and reflects the size of the geographic area (city, state, region) targeted by the SVA.

SVA COST ESTIMATES

Costs of the study[17] vary significantly from one country to another. Costs related to the market research and public opinion polling are estimated for mid-range countries of the ESOMAR Global Prices Study, such as Croatia, Serbia, Romania, Bulgaria, Ukraine, etc. The price levels are higher in more developed nations and lower in less developed countries.

Countries with the highest price levels, such as Switzerland, the UK, Sweden, Germany, Denmark, France and the Netherlands, probably have about 50% higher prices than those listed in Table 6 below.

Estimated costs are higher if an additional survey research needs to be performed to collect the data that cannot be collected from official statistics, or if the data are outdated/unreliable. The estimated survey research costs are listed in Annex 2.

The responsibilities for the specific stages of the research should be divided between the SVA expert/consultant and the market research/public opinion company. Namely, it is recommended that the company should be responsible for the survey research, as well as for qualitative research (in-depth interviews, focus groups, Delphi method), whereas the SVA expert/consultant should perform the desk research, index calculation and validation.

The SVA expert/consultant should also assist the company in developing its part of the research (interview guide, focus group guide, etc.). The costs of the expert/consultant are calculated on the premise of a $200 daily fee (other expenses excluded). It is expected that version one (see Table 6 below) shall require 30 expert's working days, version two 45 working days, and version three 60 working days.

SIZE	INDICATOR DEVELOPMENT	INDEX CALCULATION	INDEX VALIDATION	TOTAL COSTS
City/ municipality	Desk research 4000	2000	-	6000
County	Desk research 4000	2000	-	6000
State	Desk research 4000	2000	-	6000

Table 6. SVA Costs without Qualitative Research in Stage 1 and without Stage 3 (in USD)

[17] Costs needed to manage the entire process were not included in this estimation.

LEVEL OF RESEARCH	INDICATORS DEVELOPMENT	INDEX CALCULATION	INDEX VALIDATION	TOTAL
City/ municipality	1. Desk research 4000 2. In-depth interviews (10 interviews) (2000) or Focus groups (2000) or Delphi method (1000)	3000	2000	10000 – 11000
County	1. Desk research 4000 2. In-depth interviews (10 interviews) (2000) or Focus groups (2000) or Delphi method (1000)	3000	2000	10000 – 11000
State	1. Desk research 4000 2. In-depth interviews (10 interviews) (2000) or Focus groups (2000) or Delphi method (1000)	3000	2000	10000 – 11000

Table 7. SVA Costs with Qualitative Research in Stage 1 and Correlational Validation in Stage 3 (in USD)

LEVEL OF RESEARCH	INDICATORS DEVELOPMENT	INDEX CALCULATION	INDEX VALIDATION	TOTAL
City/ municipality	1. Desk research (4000) 2. In-depth interviews (10 interviews) (2000) or Focus groups (2000) or Delphi method (1000)	3000	2000	13000 – 15000
County	1. Desk research (4000) 2. In-depth interviews (10 interviews) (2000) or Focus groups (2000) or Delphi method (1000)	3000	2000	7000 - 11000
State	1. Desk research (4000) 2. In-depth interviews (10 interviews) (2000) or Focus groups (2000) or Delphi method (1000)	3000	2000	7000 - 11000

Table 8. SVA Costs with Qualitative Research in Stage 1 and Qualitative Research Validation in Stage 3 (in USD)

Type/Sample Size	N=500	N=1000	N=2000
Online	1500 - 2000	3000 – 4000	6000 – 8000
CATI	2000 – 2500	4000 – 5000	8000 – 10000
F2F	3000 – 3500	6000 – 7000	12000 – 14000

Table 9. Estimated Survey Costs in USD (Data Collection, Average Duration 15 Minutes)

Note: These market research and public opinion polling costs are estimated (according to the ESOMAR Global Prices Study) for mid-range countries, such as Croatia, Serbia, Romania, Bulgaria, Ukraine, etc.

The price levels are higher in more developed countries and lower in less developed countries.

Countries with the highest price levels, such as Switzerland, the UK, Sweden, Germany, Denmark, France and the Netherlands, probably have about 50% higher prices than those listed in the above Table.

ANNEX 3

OUTLINE OF THE TERMS OF REFERENCE (DELIVERABLES)

The SVA expert/consultant shall:

1. Conduct desk research
2. Develop social vulnerability indicators based on the desk research and qualitative and (possibly) quantitative research conducted by a market research/public opinion company
3. Assist the market research/public opinion company in developing interview/focus group/Delphi method guides for the pilot research and validation research
4. Assist the market research/public opinion company in developing a survey questionnaire (in case a survey will be conducted)
5. Calculate social vulnerability indexes, map the results and prepare the research report

The market research/public opinion company shall:

1. Develop interview/focus group/Delphi method guides for pilot research and validation research in cooperation with the expert/consultant
2. Conduct focus groups/interviews, Delphi method research and prepare the data transcripts
3. Develop a survey questionnaire in cooperation with the expert/consultant (in case a survey will be conducted)
4. Conduct a survey and deliver the survey research data in the appropriate form (in case a survey will be conducted)

COMPARABLE SOCIAL VULNERABILITY PROFILING (CSVP) – CASE STUDY IN CROATIA

Comparable Social Vulnerability Profiling (CSVP) tested in Croatia in 2015 presents a very simplified and user friendly method that can be implemented even at the local level without the need for expert support wherefore it basically provides a foundation for future project planning. The CSVP methodology relies on two important pillars: data simplicity and comparability.

The CSVP opted to use the census data as they are collected systematically and then professionally analyzed by the Croatian Bureau of Statistics. Furthermore, these data are temporally consistent (the Census is conducted every ten years), easy to use and in that sense, fully adaptable to the needs of this social vulnerability methodology.

Furthermore, census based data collection/analysis has to be: a) related to some sort of geographic scale (level of municipality/city/county) sufficient to identify demographic differences determining the location of vulnerable population groups; and b) flexible and, most importantly, applicable in different phases of the disaster cycle and different event types, depending on how the readily accessible components best fit the user's needs.

In order to determine the vulnerability levels of the respective communities (municipalities/cities) within one area (at the county or national level), all the results derived from the respective vulnerability assessments were compared with the common denominator – in this particular case, seven respective communities (villages, municipalities, cities) were compared with the higher level territorial unit i.e. a county.

Selection of CSVP Variables

Selected variables comprising CSVP indicators were restricted to quantifiable indicators. Furthermore, the CSVP was limited exclusively to vulnerability indicators so that no hazard indicators were included in the study. In line with the 2011 Census data, six vulnerability indicators were included: Age, Gender, Disability/ Dependency, Income, Minorities and Education.

The CSVP does not apply weights to vulnerability indicators, therefore the six presented indicators are considered to be independent and equally important variables. The reasoning behind this decision is that standardization in terms of the weighting and aggregation of indicators is a subjective process and different methods of weighting and aggregation may lead to conflicting results.

Moreover, even though any single one of the given indicators in isolation does not have to make a person vulnerable, a combination of these indicators, or the relationship between the indicators, may render an individual highly vulnerable[18]. As such a process would call for a more comprehensive study, the CSVP does not explore these effects of combinations of particular indicator values compared with other combinations.

[18] Dwyer et al., 2004

The CSVP uses the experiences of SoVI – the Social Vulnerability Indicator (analyzing 11 key variables from the U.S. Census)[19] but it is still closer to Social Vulnerability Profiling (SVP), which is similar to SoVI but uses fewer variables. Furthermore, the CSVP, which applies the same methodology as SVP, is performed by obtaining the relevant census information for each of the indicator variables for the project area at the appropriate level of the spatial scale.

Once the data have been assembled, they can be summarized using basic percentages and proportions to compare and contrast areas. As opposed to the SoVI, it does not employ a statistical procedure to generate vulnerability dimensions. The method provides a simpler and more straightforward way of characterizing socially vulnerable populations than the SoVI[20]. Therefore, this paper presents the CSVP variables, derived from the 2011 Census in Croatia, in total figures and in percentages, thus creating a background for simplified comparable analysis.

Each of the six vulnerability indicators with associated increased vulnerability namely population under 15 and over 65 years of age, female population, population without secondary education, vulnerable minorities, population without income and disabled/dependent population is marked with a plus sign "+" and colored red as that group is considered more vulnerable to natural disasters.

On the other hand, population between 15 and 65 years of age, male population, population with secondary or higher education, majority population-majorities, population with income and population without a disability/dependency is marked with a minus sign "-" and colored green as that group is considered less vulnerable to natural disasters.

The share of the CSVP vulnerable population group in the total population is then calculated in the following manner:

$$\text{CSVP variable (CSVPv)} = \frac{\text{Total number of vulnerable group}}{\text{Total number of population}} \text{ X } 100\%$$

Once all the vulnerability variables are mathematically calculated they are all included in one overall table representing the Comparable Social Vulnerability Profile of the respective municipality/city/county. This CSVP "ID-card" is the foundation for all the comparisons that will follow in step two. In this calculation segment, once all the vulnerability variables are calculated and presented in overall vulnerability tables, the calculated figures can be compared head-to-head between the respective municipalities, cities and counties. Comparisons can also be made between the above mentioned categories as long all the vulnerability variables can be compared.

As mentioned, vulnerability variables are presented as a share of the respective category in the total population. Only variables recognized as increasing the level of vulnerability are being compared (marked with the plus sign "+"and colored red).

[19] http://webra.cas.sc.edu/hvri/products/soci.aspx
[20] Social vulnerability to natural hazards – Sue Tapsell, Simon McCarthy, Hazel Faulkner, Megan Alexander – Flood Hazard Research Centre (FHRC), Middlesex University

The result of this comparison is presented for each vulnerability category respectively (e.g. a specific community can have higher vulnerability in terms of the AGE variable and lower vulnerability in the EDUCATION variable).

And finally, as there are six vulnerability categories represented without weighting, meaning that they are all of equal value, overall comparison is conducted in the following manner: a community having 4, 5 or 6 higher vulnerability categories is recognized as more vulnerable (as opposed to a community with 1 or 2 higher vulnerability categories, which is recognized as less vulnerable). In case more than one of the compared communities have three vulnerability categories, all of them are recognized as equally vulnerable.

And finally, in order to determine the vulnerability levels between the respective communities (municipalities/cities) within one area (at the county or national level), all the results derived from the respective vulnerability tables need to be compared against a common denominator - either a county or the state. Each respective community vulnerability variable is then compared with the reference vulnerability variable. If the respective community vulnerability variable is higher than the reference vulnerability variable, it is colored red. In the opposite case, it is colored green, meaning that the vulnerability of the community is lower than that of its reference point (county/state) with respect to that particular variable..

Vulnerability variables colored red (higher than the reference vulnerability) are then added up and presented by a value ranging from zero to "plus" six (0 to +6). This field is also colored red.

Vulnerability variables colored green (lower than the reference vulnerability) are then added up and presented by a value ranging from zero to "minus" six (0 to -6). This field is also colored green.

Overall community (municipality/city) vulnerability when cross-referenced to the common denominator (county/state) is determined in the following manner:

- Communities with zero or one (0 or 1) higher vulnerability variables (colored red and marked with a plus sign) are recognized as "low vulnerability communities" and colored green
- Communities with two (2) higher vulnerability variables (colored red and marked with a plus sign) are recognized as "medium-low vulnerability communities" and colored light-green
- Communities with three (3) higher vulnerability variables (colored red and marked with a plus sign) are recognized as "medium vulnerability communities" and colored yellow
- Communities with four (4) higher vulnerability variables (colored red and marked with a plus sign) are recognized as "medium-high vulnerability communities" and colored orange
- Communities with five or six (5 or 6) higher vulnerability variables (colored red and marked with a plus sign) are recognized as "high vulnerability communities" and colored red

The final result of this calculation method is presented in Table 10 below where all the cities and municipalities in a Croatian county were analyzed by using the county level as the common denominator.

CSVP Comparability Table Lika-Senj County									
CSV Profile	Age (v)	Gender (v)	Education (v)	Minority (v)	Income (v)	Disability (v)	RESULT		CSVP
Lika-Senj	43.96%	50.23%	57.67%	14.76%	29.34%	20.65%	REFERENCE		
Lovinac	50.55%	48.16%	61.47%	16.48%	23.04%	18.67%	-3	+3	M
Brinje	40.69%	50.58%	67.69%	6.54%	35.04%	25.49%	-2	+4	M-H
Donji Lapac	38.76%	49.69%	57.31%	80.97%	18.22%	18.84%	-5	+1	L
Gospić	37.23	50.33%	56.43%	6.02%	30.83%	20.21%	-4	+2	M-L
Karlobag	40.13%	50.49%	54.42%	4.14%	24.54%	23.45%	-4	+2	M-L
Novalja	37.1%	49.3%	52.01%	3.38%	30.74%	14.14%	-5	+1	L
Otočac	37.49%	49.99%	42.11%	7.83%	32.51%	20.09%	-5	+1	L
Perušić	46.1%	49.7%	67.32%	8.91%	25.44%	25.36%	-3	+3	M
Plitvička J.	37.34%	51.13%	57.42%	28.17%	30.76%	18.39%	-3	+3	M
Senj	34.88%	50.61%	52.98%	2.3%	27.67%	16.42%	-5	+1	L
Udbina	42.74%	50.43%	63.98%	52.35%	22.41%	26.31%	-2	+4	M-H
Vrhovine	40.19%	50.76%	57.06%	80.96%	21.87%	14.12%	-4	+2	M-L

Low | Medium low | Medium | Medium high | High

Table 10. CSVP Vulnerability Table – Final Result
Source: Comparable Social Vulnerability Profiling – CSVP Case Study: Croatia (2015)

Bergstrand, Kelly; Mayer, Brian; Brumback, Babette, Zhang, Yi (2015). Assessing the Relationship Between Social Vulnerability and Community Resilience to Hazards. Social Indicators Research, 122: 391-409.

Bogard, W.C. (1989). Bringing social theory to hazards research: conditions and consequences of the mitigation of environmental hazards. Sociological Perspectives, 31: 147-168.

CAMP Alatoo: Testing of Climate Risk Assessment Methodology in Kyrgyzstan (2013)

Cattell, R.B. (1978). The Scientific Use of Factor Analysis. New York: Plenum.

Chattopadhyay, Sandip; Dasgupta, Ranjan (2015). Demographic and Socioeconomic Impact on Risk Attitudes of the Indian Investors – An Empirical Study. Asian Economic and Financial Review, 5(4):601-623.

Cutter, S.L.; Boruff, B.J.; Shirley, W.L. (2003). Social Vulnerability to Environmental Hazards. Social Science Quarterly, 84(2): 242-261.

Comparable Social Vulnerability Profiling – CSVP Case Study: Croatia (2015).

Dohmen, T., A. Falk, D. Huffman, U. Sunde, J. Schupp and G. G. Wagner. (2005). Individual Risk Attitudes: New Evidence from a Large, Representative, Experimentally-Validated Survey. Discussion Papers of DIW Berlin 511, DIW Berlin, German Institute for Economic Research.

Douglas, Mary; Wildavsky, Aaron (1982). Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers. Berkeley and Los Angeles: University of California Press.

Dow, K. (1992). Exploring Differences in Our Common Future(s): The Meaning of Vulnerability to Global Environmental Change. Geoforum, 23: 417-436.

Emrich, C. T. 2005. Social Vulnerability in US Metropolitan Areas: Improvements in Hazard Vulnerability Assessment. PhD dissertation, University of South Carolina, Columbia, SC.

Everitt, B.S. (1975). Multivariate Analysis: The Need for Data, and Other Problems. British Journal of Psychiatry, 126: 237-240.

Gassmann, F., Berulava, G., Tokmazishvili, M. (2013): Economic and Social Vulnerability in Georgia UNDP.Harris, Christine R.; Jenkins, Michael; Glaser, Dale (2006). Gender Differences in Risk Assessment: Why do Women Take Fewer Risks than Men? Judgment and Decision Making, 1(1): 48-63.

Hartog, Joop; Ferrer-i-Carbonell, Ada; Jonker, Nicole (2002). Linking Measured Risk Aversion to Individual Characteristics. Kyklos, 55(1): 3-26.

Holand, I.S.; Lujala, P.; Rød, J.K. (2011). Social vulnerability assessment for Norway: A quantitative approach, NorskGeografiskTidsskrift - Norwegian Journal of Geography, 65:1-17.

Holand, I.S.; Lujala, P. (2013). Replicating and Adapting an Index of Social Vulnerability to a New Context: A Comparison Study for Norway. The Professional Geographer, 65(2): 312–328.

REFERENCES

Kim, De-Yeong; Park, Junsu (2010). Cultural differences in risk: The group facilitation effect. Judgment and Decision Making, 5(5): 380-390.

Lau, Lai-Yin; Ranyard, Rob (2005). Chinese and English Probabilistic Thinking and Risk Taking in Gambling. Journal of Cross-Cultural Psychology, 36(5): 621-627.

Nelson, Judy (2012). Are Women Really More Risk-Averse than Men? Global Development and Environment Institute Working Paper No. 12-05. Medford (MA): Tufts University.

Nieboer, Jeroen (2013). Risk taking in diverse groups: Gender matters. CeDEx Discussion Paper Series, Discussion Paper No. 2013-06. Nottingham: University of Nottingham.

Oulahen, Greg, Mortsch, Linda, Tang, Kathy, Harford, Deborah (2015). Unequal Vulnerability to Flood Hazards: "Ground Truthing" a Social Vulnerability Index of Five Municipalities in Metro Vancouver, Canada. Annals of the Association of American Geographers, 105(3): 473–495.

Park, Yoonkyung; Pradhan, Ananta Man Singh; Kim, Ungtae; Kim, Yun-Tae, and Kim, Sangdan (2016). Development and Application of Urban Landslide Vulnerability Assessment Methodology Reflecting Social and Economic Variables. Advances in Meteorology.

Shupp, R.S.; Williams, A.W. (2008). Risk preference differentials of small groups and individuals. The Economic Journal, 118(525): 258-283.

Straus, Susan G.; Parker, Andrew M.; Dembosky, Jacob W. (2009). The Group Matters A Review of the Effects of Group Interaction on Processes and Outcomes in Analytic Teams (Working Paper). RAND – National Security Research Division.

Empowered lives.
Resilient nations.

UNDP Istanbul Regional Hub

Key Plaza, Abide-I Hurriyet Cad. Istiklal Sk. No:11,
34381, Sisli, Istanbul, TURKEY

For more information: www.undp.org/