

Annex II: Full Table - Currently Used Migration-Related Disaster Risk Indicators and Their Interpretation

Variable	Counts of Indices with that variable	Framing of Migration Impact	Reference	Short Explanation Migration Impact
<b>Internal Migration</b>				
<i>Population Stability</i>				
Duration of stay in current residence	1	negative	Community Coastal Vulnerability Index (CCVI) (Orencio & Fujii 2013)	New arrivals (immigrants) as vulnerable group (limited understanding of local language, services, values and laws; restricted support networks and access to social support services).
Percentage of residents who moved into their current house in 1995-1998	1	negative	Indicators of Vulnerability and Resiliency for Fishing Communities (Jacob et al. 2013)	New residents are expected to "suffer" from "housing disruption" which is seen to be a sign of high vulnerability/ low resilience.
Percentage of residents who moved into their current house in 1999-2000	1	negative	Indicators of Vulnerability and Resiliency for Fishing Communities (Jacob et al. 2013)	New residents are expected to "suffer" from "housing disruption" which is seen to be a sign of high vulnerability/ low resilience.
Percentage of migrated households in last 5 years	1	negative	Socioeconomic Vulnerability Index (SeVI) (Ahsan & Warner 2014)	Migrant-Sending-Households are thought to have a lower adaptive capacity and increased vulnerability (migration is here seen as sign of failed adaptation).
Percent population born in a state that still resides in that state	2	negative	Baseline Resilience Indicators for Communities (BRIC) (Cutter et al. 2010)	Population born in a state that still resides in that state is considered to have a greater degree of "place attachment" which is expected to be positive for resilience.
		negative	Baseline Resilience Indicators for Communities (BRIC) - 2014 Version (Cutter et al. 2014)	"[...] a precipitous drop in population results in large reductions of local tax incomes. The latter can have deleterious effects on local government disaster preparedness and mitigation budgets" (Cutter et al. 2014, p. 70).
Annual average percentage over a five-year period of a metro area population that lived within the same metro area a year prior	1	unclear (paper inaccessible)	Resilience Capacity Index (Building Resilient Regions Research Project 2011)	Paper inaccessible
A high percentage of residents have lived in the community a long time	1	unclear	Rural Resilience Index (Justice Institute of British Columbia 2012; Cox & Hamlen 2015)	No explanation of this indicator was found.
Immigration across county border per head	1	negative	Social Vulnerability Index (SoVI) (Hiete et al. 2012)	Refers to Cutter et al. (2010, p. 10) "[...] a high net international migration reduces resilience".
% of out migration	1	negative	Socioeconomic Vulnerability Index (SeVI) and Built Environment Index (BEVI) (Holand et al. 2011)	"Municipalities with high levels of out-migration face problems with financing their services and attracting competent labour. Therefore, we adopt outmigration as an indicator in our socioeconomic vulnerability index" (Holand et al. 2011, p. 6).
High outmigration	1	negative	SoVI Norway (Holand & Lujala 2013)	"[...] we consider high levels of outmigration to signify population decline or demographic instability, thus increasing the likelihood of a deteriorating financial situation and problems with attracting competent labor" (Holand & Lujala 2013, p. 318).

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<i>Temporary Population</i>				
Percent of temporary population	1	<i>negative</i>	<i>Social Vulnerability Index SOVI (Zhang &amp; Hong 2013)</i>	<i>No real explanation found. Temporary population is considered to increase social vulnerability.</i>
Seasonal influxes are predictable	1	<i>negative</i>	<i>Rural Resilience Index (Justice Institute of British Columbia 2012; Cox &amp; Hamlen 2015)</i>	<i>Population stability is seen as a sign of resilience which is disturbed by in- and outmigration.</i>
What are the trends in relative size of the permanent resident population and the daily population	1	<i>unclear</i>	<i>Torrens Community Disaster Resilience Scorecard (Arbon et al. 2012)</i>	<i>No explanation found.</i>
<i>Other</i>				
Internally Displaced People	2	<i>negative</i>	<i>Index for Risk Management InfoRM (De Groeve et al. 2015; Marin-Ferrer et al. 2017)</i>	<i>Uprooted people are a vulnerable group "because they are not a part of the society as well as the social system, only partially supported by the community and often trigger the humanitarian intervention" (De Groeve et al. 2015, p. 38). Indicators for "Uprooted People" are: — Number of refugees (source: UNHCR), — Number of returned refugees (source: UNHCR), — Number of Internally Displaced Persons (source: IDMC) (De Groeve et al. 2015, p. 38).</i>
		<i>negative</i>	<i>South Asia Women's Resilience Index (Mirchandani 2014)</i>	<i>Internally displaced women as vulnerable group e.g. "[...] when female internally displaced persons (IDPs) lacked access to sanitary towels and private spaces for washing, or disposal facilities at shelters, with direct implications for the overall reproductive health of the population" (Mirchandani 2014, p. 26).</i>
Percent of households without family member working in a different community	3	<i>positive</i>	<i>Livelihood Vulnerability Index (Toufique &amp; Islam 2014)</i>	<i>"Remittances play an important role in reducing vulnerability. Households having no migrant member do not get any remittances"(Toufique &amp; Islam 2014, p. 238).</i>
		<i>positive</i>	<i>Livelihood Vulnerability Index (Shah et al. 2013)</i>	<i>No explanation found.</i>
		<i>negative</i>	<i>Livelihood Vulnerability Index (Hahn et al. 2009)</i>	<i>"Although this migration [households sending members to other community to work there] may fill immediate income needs, historically this practice exacerbated the HIV/AIDS epidemic in Mozambique and South Africa. This widely studied phenomenon was the rationale for assigning higher vulnerability scores to households reporting family members working outside the community" (Hahn et al. 2009, p. 84).</i>
'Non-local' population	1	<i>Conceptually unclear</i>	<i>Coastal Vulnerability Index (Kunte et al. 2014)</i>	<i>Conceptually unclear if migrants or tourists are meant.</i>
Individuals with specialized training and skills come and remain in the community	1	<i>positive</i>	<i>Rural Resilience Index (Justice Institute of British Columbia 2012; Cox &amp; Hamlen 2015)</i>	<i>Inflow of skilled people through migration is expected to increase resilience.</i>

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There is a relatively stable blend of newcomers and longtime residents	1	negative	<i>Rural Resilience Index (Justice Institute of British Columbia 2012; Cox &amp; Hamlen 2015)</i>	<i>Population stability is seen as a sign of resilience, which is disturbed by fluctuating in- and outmigration.</i>
<b>International Migration</b>				
<i>Foreign Born Population</i>				
% recent international migration	1	negative	<i>Social Vulnerability to Climate-Sensitive Hazards (Emrich &amp; Cutter 2011)</i>	<i>No real explanation found; immigration is considered to increase social vulnerability.</i>
% first or second generation non-western immigrants	1	negative	<i>Socioeconomic Vulnerability Index (SeVI) and Built Environment Index (BEVI) (Holand et al. 2011)</i>	<i>"We measure the potential lack of incorporation into mainstream society and linguistic barriers by including the percentage of population that are first or second generation immigrants of non-Western origin" (Holand et al. 2011, p. 6).</i>
% first generation western immigrants	1	negative	<i>Socioeconomic Vulnerability Index (SeVI) and Built Environment Index (BEVI) (Holand et al. 2011)</i>	<i>"We also add a variable for first generation Western immigrants that may face similar barriers even though they tend to have a good command of English, move to Norway to take up high status jobs, and have education that is more readily approved by the administration (relevant, for example, to doctors and nurses)" (Holand et al. 2011, p. 6).</i>
Western immigrants	1	positive	<i>SoVI Norway (Holand &amp; Lujala 2013)</i>	<i>"Western immigrants tend to hold high-income positions, indicating low levels of vulnerability" (Holand &amp; Lujala 2013, p. 317).</i>
% Population not foreign-born persons who came to US within previous five years	1	negative	<i>Baseline Resilience Indicators for Communities (BRIC) - 2014 Version (Cutter et al. 2014)</i>	<i>Foreign-born as vulnerable group.</i>
Non-western immigrants	1	negative	<i>SoVI Norway (Holand &amp; Lujala 2013)</i>	<i>No real explanation found; but says that high proportion of non-Western immigrants is an indicator of places that are relatively vulnerable.</i>
Population without Canadian citizenship	1	negative	<i>Social vulnerability to disasters (Andrey &amp; Jones 2008)</i>	<i>Non-citizen Population without Canadian citizenship shows social disadvantages:</i> <ul style="list-style-type: none"> <li>- <i>Limited employment opportunities;</i></li> <li>- <i>Limited access to financial aid following hazard event;</i></li> <li>- <i>Limited access to health care;</i></li> <li>- <i>Limited choice of where to live;</i></li> <li>- <i>Limited political power;</i></li> <li>- <i>Language barriers.</i></li> </ul>
Proportion of migrant/permanent residents	1	negative	<i>Urban Public Safety Index (Yu et al. 2014)</i>	<i>No real explanation found; migrant residents are considered to increase community instability.</i>
Permanent resident	1	unclear	<i>Vulnerability Index (Yan &amp; Xu 2010)</i>	<i>No explanation found.</i>
Foreign born population (year of entry 1990-2000) as % of total foreign-born population	2	negative	<i>Multihazards of Place Vulnerability (Tate et al. 2010)</i>	<i>Immigrants as vulnerable group.</i>
		negative	<i>Place Vulnerability Index (Borden et al. 2007)</i>	<i>Minority ethnicity common among migrants and related with vulnerability.</i>
<i>Migration Rate</i>				

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Net international Migration	4	negative	<i>Baseline Resilience Indicators for Communities (BRIC) (Cutter et al. 2010)</i>	"[...] a high net international migration reduces resilience"(Cutter et al. 2010, p. 10).
		negative	<i>Community Resilience Index (Sherrieb et al. 2010)</i>	"Population changes or migration can indicate a stress on resources or a loss of human capital" (Sherrieb et al. 2010, p. 229).
		negative	<i>Risk Mapping Index (DARA 2013)</i>	"[Migrants are] highly vulnerable due to their lack of knowledge about the areas they are living in. These migration flows have increased overcrowding in cities and contributed to unsafe housing as incoming migrants generally lack resources, leading them to build their houses in locations with higher exposure and low quality materials. As most migrants come from rural areas, they tend to continue their rural practices, such as animal husbandry, which are ill-suited for the urban area and lead to unsanitary conditions. Migrant populations are generally less connected to the community and have fewer resources" (DARA 2013, p. 56).
		negative	<i>Social Vulnerability Index (SoVI) (Schmidlein et al. 2008; Cutter et al. 2003)</i>	"Other characteristics identify special needs populations or those that lack the normal social safety nets necessary in disaster recovery, such as [...] non-English speaking immigrants [...]" (Cutter et al. 2003, p. 245). "New migrants may not speak the language and not be familiar with bureaucracies for obtaining relief or recovery information, all of which increase vulnerability" (Cutter et al. 2003, p. 248).
% international migration	1	negative	<i>Social Vulnerability to Climate-Sensitive Hazards (Emrich &amp; Cutter 2011)</i>	No real explanation found; immigration is considered to increase social vulnerability.
Immigration across federal border per head	1	negative	<i>Social Vulnerability Index (SoVI) (Hiete et al. 2012)</i>	Refers back to Cutter et al. (2010): Population born in a state that still resides in that state is considered to have a greater degree of "place attachment" which is considered to be positive for resilience.
<b>Refugees</b>				
Returned Refugees	1	negative	<i>Index for Risk Management InfoRM (De Groeve et al. 2015; Marin-Ferrer et al. 2017)</i>	Uprooted people are a vulnerable group "because they are not a part of the society as well as the social system, only partially supported by the community and often trigger the humanitarian intervention" (De Groeve et al. 2015, p. 38) Indicators for "Uprooted People" are: — Number of refugees (source: UNHCR), — Number of returned refugees (source: UNHCR), — Number of Internally Displaced Persons (source: IDMC) (De Groeve et al. 2015, p. 38)
UNHCR's population of concern aged 60 and over relative	1	negative	<i>Disaster Risk and Age Index (Mihnovits et al. 2015)</i>	UNHCR's population of concern (= refugees, returnees, stateless people, the internally displaced and asylum-seekers) are seen as a vulnerable population group.
UNHCR's population of concern aged 60 and over absolute	1	negative	<i>Disaster Risk and Age Index (Mihnovits et al. 2015)</i>	UNHCR's population of concern (= refugees, returnees, stateless people, the internally displaced and asylum-seekers) are seen as a vulnerable population group.

Variable	Counts of Indices with that variable	Framing of Migration Impact	Reference	Short Explanation Migration Impact
Refugees by country of asylum	1	<i>negative</i>	<i>Index for Risk Management InfoRM (De Groeve et al. 2015; Marin-Ferrer et al. 2017)</i>	<p><i>Uprooted people are a vulnerable group "because they are not a part of the society as well as the social system, only partially supported by the community and often trigger the humanitarian intervention" (De Groeve et al. 2015, p. 38) Indicators for "Uprooted People" are:</i></p> <ul style="list-style-type: none"> <li><i>— Number of refugees (source: UNHCR),</i></li> <li><i>— Number of returned refugees (source: UNHCR),</i></li> <li><i>— Number of Internally Displaced Persons (source: IDMC) (De Groeve et al. 2015, p. 38).</i></li> </ul>
<i>Other</i>				
Percentage of household in which at least 1 member has migrated for earning	1	<i>negative</i>	<i>Climate Vulnerability Index (Pandey &amp; Jha 2012)</i>	<i>No real explanation found. The existence of migrants seems to be understood as indicating few livelihood opportunities in a region.</i>