Indicator 6.38:

Resilience of forest-dependent communities

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What is the indicator and why is it important?

Resilience of forest-dependent communities is an indicator of social sustainability. The goal of this indicator is to provide information on the extent to which communities that depend on forests for their well-being, livelihoods, subsistence, quality of life, or cultural identity are able to respond and adapt to social and economic change using definitions and approaches that best reflect each country's national experiences. The resultant methodology should enable reporting on the health of forest-dependent counties and trends over time.

There are two key components of this indicator that need to be defined to develop a measure for the resilience of forest-dependent communities: forest dependence and resilience. First, a community's forest-dependence is defined by its spatial, economic, and cultural relationship with the forest (Kusel 1996, Newton et al. 2016). Second, community resilience is defined as the existence, development, and engagement of "community capitals" by community members to thrive in an environment characterized by change, uncertainty, unpredictability, and surprise (Magis 2010).

All data sources and definitions are listed in appendix 6.38a.

Forest dependence
The level of analysis chosen in the United States for this indicator is the county, which is a political and administrative sub-division of a State. Residents within a county share this level of local government, which frequently provides many types of social services. Although counties are not perfect proxies for "communities," many data sources do not report at smaller geographic scales or would leave geographic gaps. Box 1 details the criteria used for the spatial, economic, and

cultural dimensions of forest dependence. A county was considered forest-dependent if it met at least one of these criteria.

Box 1. Criteria for identifying forest-dependent counties

1. Spatial relationship: More than 75 percent of county area is forested.

2. Economic dependence: More than 10 percent of employees are in the forest sector or more than 15 percent of earnings are from the forest sector.

3. Cultural connection: More than 30 percent of county area is forested and more than 5 percent of population is indigenous. Indigenous peoples are recognized globally as having deep cultural connections to their natural surroundings. To be sure, groups other than indigenous populations are known to have a cultural connection to forests; however, data for other potential measures are lacking at this time.

Figure 38-1 shows the counties identified as forest-dependent using the criteria in box 1 and 2018 data. There are 524 counties (17 percent) that are categorized as forest-dependent. For comparison purposes, we grouped the remaining counties into metro, non-forest-dependent (1049 counties, 33 percent) and non-metro, non-forest-dependent (1565 counties, 50 percent) counties. Forest-dependent counties include both metro and non-metro counties.

Community resilience
The "community capitals framework" describes assets or resources that can be employed to develop communities that are economically, environmentally, and socially sustainable (Flora et al. 2016). These assets include human, social, physical, financial, and natural "capitals." This framework has been adopted by various organizations
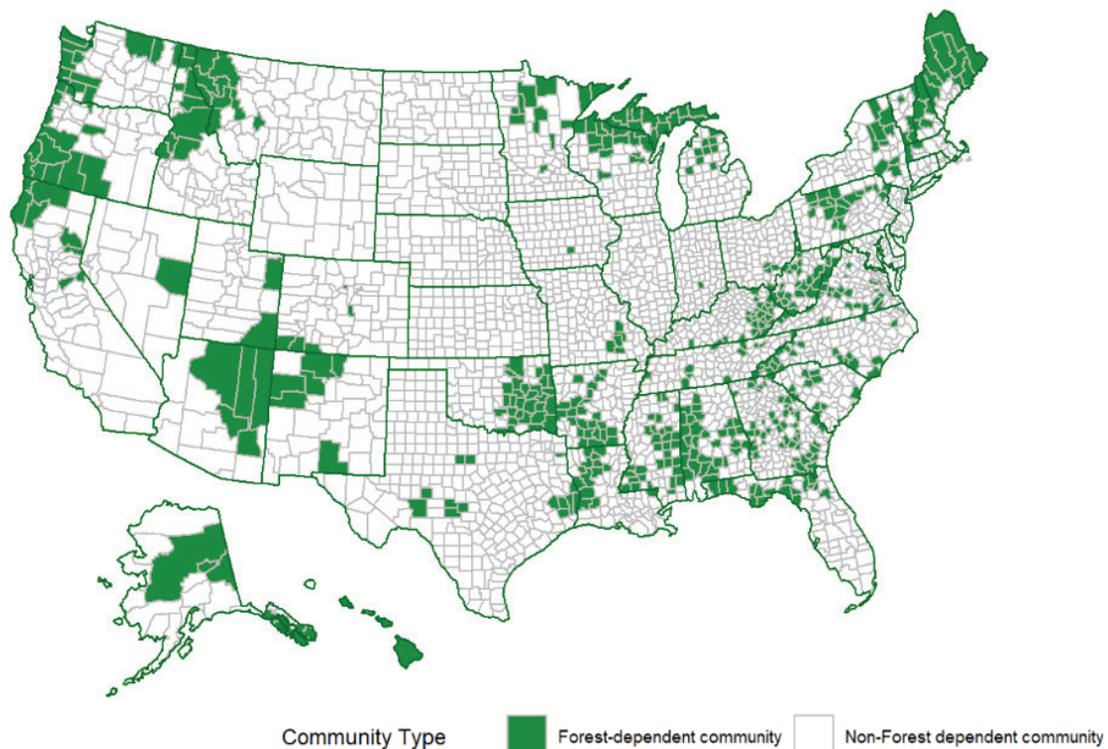
Figure 38-1—Counties that meet one or more criteria for forest dependence.

to understand sustainability and resilience of livelihoods. A community with a high endowment and balanced investment in these capitals will more likely be resilient in the face of sudden events or long-term change (UNDP 2015). These capitals interact with one another and are often seen as interrelated. Since a proxy for natural capital is included in the criteria for forest dependence, this report does not separately address natural capital. Box 2 explains four of the remaining community capitals and measures selected for reporting.

Box 2. Measures of resilience based on the Community Capitals Framework

Human Capital represents the knowledge and experience that allow people to engage with strategies to respond and adapt to social and economic changes. The variable used is percent of residents (age 25+) with a high school diploma.

Social Capital represents the factors that hold community together. Social capital is seen as the link that ties and influences many community activities, which would lead to a better response to changes. Though it is difficult to find a precise measure of social capital, we used percent of residents younger than 65, percent minority, and percent of residents who speak English at least well.

Physical Capital refers to the built infrastructure necessary to support community. Availability and accessibility of physical capital can help people to respond to changes. Physical capital includes communication and information infrastructure, as well as transport, sanitation, etc. The variable we used to measure this capital is broadband internet connections (per 100 residents).

Financial Capital refers to economic resources measured in terms of money used to buy necessary products and services. Employment and income are the typical variables that are used to represent financial capital. A strong financial capital helps communities better cope with disturbances (UNDP 2015). The variables used are income per capita, percent of residents living above poverty, and percent of working-age residents employed.

What does the indicator show?

A population-weighted arithmetic mean for each measure was calculated for each group of counties (forest-dependent counties [FDC]; non-metro, non-forest-dependent counties [NMNFDC]; metro, non-forest-dependent counties [MNFDC]). Using the population weights of counties allows us to relay averages of the entire population of residents of the counties in each category (fig. 38-2).

Percentage of Residents with High School Diploma: Approximately 87 percent of residents of FDCs have a high school diploma, which is similar to other counties, and intermediate between MNFDCs and NMNFDCs.

Percentage of Residents Younger than 65: Approximately 81 percent of residents of FDCs are younger than 65 years old, which is similar to those in NMNFDCs and lower than those in MNFDCs.

Percentage of Minority Residents: About 27 percent of residents in FDCs are considered minorities (groups other than white, non-Hispanic). This is higher than residents of NMNFDCs, but lower than residents of MNFDCs. This is at least partially due to the fact that indigenous peoples are considered minorities and are by definition more likely to be in forest-dependent counties because of criterion 3 for forest-dependence.

Although minority status is frequently reported in relation to community capitals and resilience, and we feel it is valuable to report here, at the time of writing we are not aware of a causal relationship between ethnic and racial diversity/homogeneity and community resiliency.

Percentage of Residents Speaking English at Least Well: About 99 percent of residents in FDCs speak English at least well, which is similar to NMNFDCs but higher than MNFDCs.

Broadband connections: FDCs have about 28 broadband internet connections per 100 residents, which is similar to NMNFDCs, but lower than MNFDCs.

Income per Capita: Residents of FDCs earn approximately $26,000/year per capita on average, which similar to NMNFDCs, but lower than MNFDCs.

Percentage of Residents Living Above Poverty Line: Approximately 83 percent of residents of FDCs live above poverty line, which is lower than those in NMFDCs and MNFDCs.
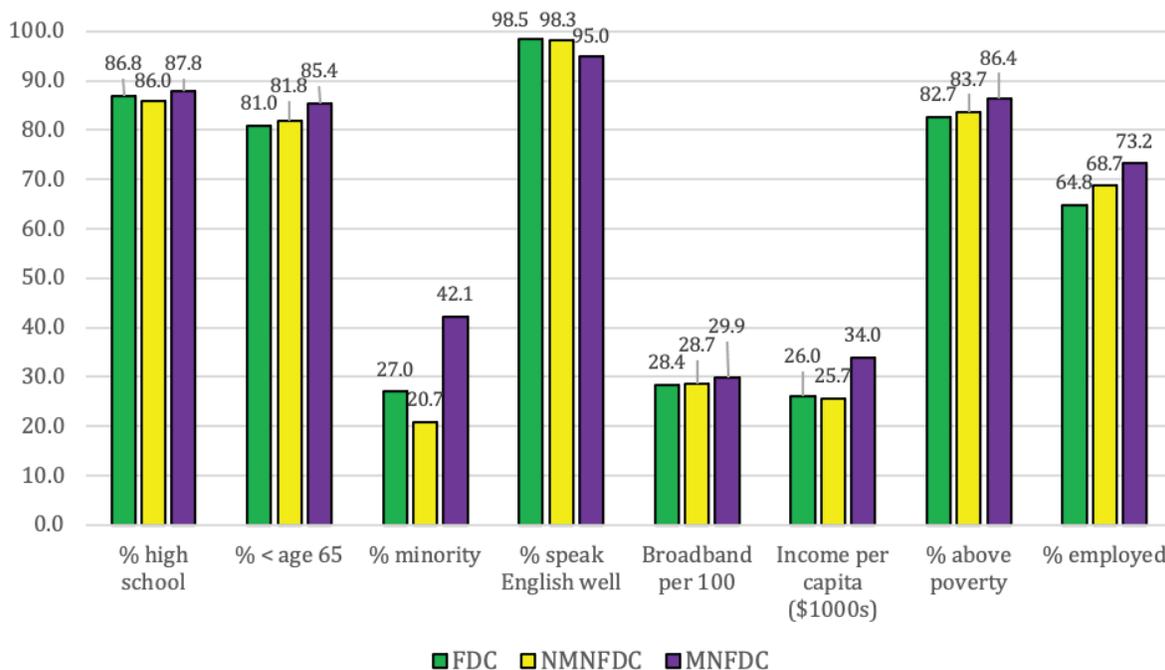

Figure 38-2—Measures of community capital averaged over total population of counties in each group. FDC = forest-dependent counties; NMNFDC = non-metro, non-forest-dependent counties; MNFDC = metro, non-forest-dependent counties.

Percentage of Working-Age Residents Employed:
Approximately 65 percent of residents age 25–64 FDCs are employed, which is lower than those in NMFDCs and MNFDCs.

In summary, compared to MNFDCs, FDCs have lower levels of most measures of resilience. Compared to NMNFDCs, FDCs have similar levels of some measures, somewhat lower or higher in others.

What has changed since 2010?

The approach taken in the 2010 report applied a Community Resilience Self-Assessment and purposive sampling protocol to measure a community's resilience from the perspective of key informants. That approach provides a deep understanding of individual communities and their self-perceptions of resilience to change, and can be applied at finer spatial definitions of community. However, it leaves large geographic gaps and would require a massive investment to apply nationwide, thereby limiting what can be said about national trends. This report, on the other hand, relies on nationally available data on county-level conditions. This allows us to provide wall-to-wall coverage, compare regional differences, and in the future, track variables over time.

Are there any limitations in applying this indicator?

Counties are not an ideal representation of communities, but offer the best data availability. Further, it is difficult to define a forest-dependent county. Prior studies that are relevant to forest-dependency are limited in the United States, and international studies use criteria and thresholds that may not be universally applicable. Thresholds for economic dependence are based on the range of values used in established U.S. definitions of community dependence for other sectors such as agriculture or mining (ERS 2019). Other thresholds are based on the authors' judgments.

Since data from the U.S. Department of Agriculture, Forest Service, Forest Inventory and Analysis (FIA) are used to determine forest cover, the FIA definition of forest is used, which excludes forest cover in most urban areas. Urban forests are an important resource for many people.

Forest-based recreation is a major economic industry in some areas, and is a major way that people connect to forested spaces. Many counties and communities that were historically economically timber-dependent, have transitioned to a more recreation-based economy. Unfortunately, we lack data that allow us to distinguish forest-based recreation from other types of recreation at this spatial scale, so we were unable to include these in our forest-dependence economic or cultural criteria. Similarly, forest-based subsistence activities are important in some communities, but no data are available to track those activities. However, our belief is that many or most of the counties with high levels of forest-based recreation, tourism, and/or subsistence would be captured in one or more of the three criteria for forest-dependence we used.

In terms of community resilience, we applied the community capitals approach. Although community capital is strongly linked to community resilience, it is not the same. Community resilience is specifically focused on response to change, whereas community capital relates more broadly to all aspects of community development (Magis 2010). Still, communities with high levels of capitals are those which are more likely to be resilient, and the community capitals framework directs us to measures that are readily available, comparable to similar work in other sectors by other Federal agencies (e.g., CDC 2018; ERS 2019; MitFLG 2016), and easily understandable.

Moreover, this study describes only the general features of forest dependency and resilience of the residents of identified counties, averaged over the whole country. This likely obscures regional and county-by-county variation, since populations of individual counties may deviate significantly from the average. Although on average forest-dependent counties have lower levels of the measures of resilience that we assessed, individual forest-dependent counties are likely to have significantly higher levels. In addition, there is variability within counties, such that one part of a particular county may score particularly high on resilience variables, whereas another part scores low.

References

CDC. 2018. Social Vulnerability Index (SVI). Atlanta, GA: U.S. Department of Health & Human Services, Centers for Disease Control and Prevention. https://svi.cdc.gov/index.html

ERS. 2019. County typology codes: documentation. Washington, DC: U.S. Department of Agriculture, Economic Research Service. https://www.ers.usda.gov/data-products/county-typology-codes/documentation/

Flora, C.B.; Flora, J.L.; Gasteyer, S.P. 2016. Rural communities: legacy + change. 5th edition. Boulder, CO: Westview Press. 488 p.

Kusel, J. 1996. Well-being in forest dependent communities, part I: a new approach. In: Status of the Sierra Nevada. Volume II: assessment and scientific basis for management options. Sierra Nevada Ecosystem Project final report to Congress. Wildland Resources Center Report No. 37. Davis, CA: Centers for Water and Wildland Resources, University of California, Davis: 361–374.

Magis, K. 2010. Community resilience: an indicator of social sustainability. Society and Natural Resources. 23(5): 401–416. DOI: 10.1080/08941920903305674

MitFLG. 2016. Draft interagency concept for community resilience indicators and national-level measures. Draft concept paper. Washington, DC: Mitigation Framework Leadership Group (U.S. Department of Homeland Security, Federal Emergency Management Agency and U.S. Department of Commerce, National Oceanic and Atmospheric Administration).

Newton, P.; Miller, D.C.; Byenkya, M.A.; Agrawal, A. 2016. Who are forest-dependent people? A taxonomy to aid livelihood and land use decision-making in forested regions. Land Use Policy. 57: 388–395.

UNDP 2015. Guidance note: Application of the Sustainable Livelihoods Framework in development projects. New York: United Nations Development Programme.

Appendix 6.38a. Data definitions and sources

Determinants of forest dependence

- Percent forest cover in 48 conterminous States and Hawaii = Forest area divided by land and water area, based on forest inventories for the years 2014–2019. USDA Forest Service, Forest Inventory and Analysis (FIA). EVALIDator Version 1.8.0.01. Retrieved February 2020 from: https://apps.fs.usda.gov/Evalidator/evalidator.jsp

- Percent forest cover in Alaska = 2016 National Land Cover Database (NLCD) sum of land cover classes 41 (deciduous forest), 42 (evergreen forest), 43 (mixed forest), and 90 (woody wetlands) divided by sum of all classes. U.S. Geological Survey, Multi-Resolution Land Characteristics Consortium. Retrieved July 2020 from: https://www.mrlc.gov/national-land-cover-database-nlcd-2016

- Employment and earnings from forest sector = Sum of employment and earnings from North American Industry Classification System (NAICS) industry classes 113 (forestry and logging), 1142 (hunting and trapping), 1153 (support activities for forestry), 321 (wood product manufacturing), 322 (paper manufacturing) divided by total employment and earnings. U.S. Census Bureau, Annual Economic Survey. Retrieved June 2020 from: https://data.census.gov/cedsci/advanced

- Percent of indigenous peoples = 100 times [Sum of American Indian or Alaska Native and Native Hawaiian or Other Pacific Islander divided by total population]. U.S. Census Bureau, American Community Survey (ACS). Retrieved July 2020 from: https://data.census.gov/cedsci/advanced

Metro/Non-metro counties

- Metro/Non-metro as determined by USDA Economic Research Service based on U.S. Office of Management and Budget 2013 definitions. Retrieved July 2020 from: https://www.ers.usda.gov/data-products/rural-urban-continuum-codes/

Measures of social capital

- Percentage of residents (age 25+) with a high school diploma = 100 - Percentage of persons with no high school diploma (age 25+) estimate. Data from 2014–2018 ACS [100-S0601_C01_033E]. Retrieved July 2020 from CDC SVI: https://svi.cdc.gov/data-and-tools-download.html

- Percentage of people younger than 65 = 100 – Percentage of persons aged 65 or older estimate. Data from 2014–2018 ACS. Retrieved July 2020 from CDC SVI: https://svi.cdc.gov/data-and-tools-download.html

- Percentage minority = (Minority (all persons except white, non-Hispanic) estimate / Total population estimate) * 100. Data from 2014–2018 ACS [(E_MINRTY/E_TOTPOP)*100]. Retrieved July 2020 from CDC SVI: https://svi.cdc.gov/data-and-tools-download.html

- Percent English-speaking at least well = 100 minus ((Persons who speak English "less than well" estimate / Population age 5 and over estimate) * 100). Data from 2014–2018 ACS [100-((E_LIMENG/B16005_001E)*100]. Retrieved July 2020 from CDC SVI: https://svi.cdc.gov/data-and-tools-download.html

- Internet connections per 1,000 population = Total connections divided by total population estimate * 1,000. Form 477 County Data on Internet Access Services. 2017 Federal Communications Commission. Retrieved July 2020 from https://www.fcc.gov/general/form-477-county-data-internet-access-services

- Income per capita = Per capita income estimate. Data from 2014–2018 ACS (B19301_001E). Retrieved July 2020 from CDC SVI: https://svi.cdc.gov/data-and-tools-download.html

- Percentage of residents living above poverty = 100 minus (Percentage of persons below poverty estimate). Data from 2014–2018 ACS [100-S0601_C01_049E]. Retrieved July 2020 from CDC SVI: https://svi.cdc.gov/data-and-tools-download.html

- Percentage employed = Total employment estimate divided by total population age 25–64 Data from 2014–2018 ACS. Retrieved July 2020