Expert Workshop on Strengthening the Global Core Set of Forest Indicators to support the implementation of the 2030 Agenda and the UN Strategic Plan for Forests 2030, October 22-24 2019 FAO, Rome

Working Group 1

WG Indicator 13 “Number of forest dependent people in extreme poverty”

Draft discussion paper

16 October 2019

Indicator 13: Number of forest dependent people in extreme poverty

Goal 2: Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people.
Target 2.1: Extreme poverty for all forest-dependent people is eradicated. (United Nations strategic plan for forests 2017-2030)

Institutional information

Organization(s):
Food and Agriculture Organization of the United Nations (FAO)
United Nations Forum on Forests (TBD – institutional arrangements to be discussed)
World Bank (TBD – institutional arrangements to be discussed)

Concepts and definitions

Definition:
This indicator is in need of mutually agreed definitions. The only element that is unequivocal is the metric, i.e. that the indicator will be expressed in terms of number of people. There are two key elements of the indicator that need clear definition: (i) forest-dependence and (ii) extreme poverty. Having defined these terms, a method will have to be established that captures the overlap between the forest dependence and extreme poverty dimensions.
Forest dependence. The literature offers several competing definitions of the term "forest-dependent people". Newton *et al.* (2016) identified 155 different characterizations of the term and convincingly argue that it is impossible to find a characterization that will satisfy all, thus challenging users to be explicit in defining the boundaries for the use of the term and the dimension of forest reliance that are emphasized in a specific definition. They provide an organizing framework to articulate the different definitions by developing a taxonomy that revolves around three main dimensions: (1) direct benefits from forests in terms of products (food, wood, NWFP/NTFPs, etc.) and services (including environmental and cultural); (2) livelihoods and reliance (subsistence or commercial, including engagement in agroforestry, plantations and timber mill operations), and (3) spatial relationship with forests (proximity, access, use rights, or downstream benefits from forests).

To arrive at a workable indicator for which data can also be made routinely available, it is proposed that the spatial dimension be given prominence, complemented as relevant by measures of income, livelihoods and direct access to forest benefits. Forest-depended people would hence be all the people living in forests, people within a certain distance from forests (with the distance threshold likely to be context specific rather than universal, reflecting location, connectivity, social and economic characteristics, etc.), or people relying substantially on forest products and services for their income, livelihoods or subsistence. An agreed upon threshold will need to be identified to define 'substantially' and the proposal is to arrive at this threshold by looking at empirical data for a cross-section of countries with different agroecological and socioeconomic characteristics, including different income levels. A workable proposal is that of using income as a proxy for livelihoods, if it is decided to consider a reliance dimension alongside the proximity

one. Income would be considered to include not only cash income, but also the valuation of subsistence production and forest services.

Extreme poverty. Poverty can be described or measured along monetary or non-monetary dimensions. Measures can also be standardized internationally or tailored to a specific geography. The most widely used measure of monetary poverty globally is the International Poverty Line (IPL) which is currently set at 1.90 international USD based on 2011 Purchasing Power Parity (PPP). Anyone with an income of less than this threshold is considered to be living in extreme poverty. This is the SDG indicator used for monitoring SDG target 1.1. Recognizing that this threshold may be set too low to identify poverty in some countries, and in general to reflect country specificities, the SDGs framework also include an extreme poverty target (1.2) defined with respect to the national poverty line. National poverty lines are defined according to a country's specific economic and social circumstances and are typically lower in poorer countries and higher in richer countries.[1]

For multidimensional poverty – measures that also take into account non-monetary dimensions - there is no internationally agreed definition. In the SDG framework the statistical community has opted for keeping definitions country specific. One indicator that has got traction is the global Multidimensional Poverty Index (MPI), that is an international measure of acute multidimensional poverty composed by ten indicators of living standards over 100 developing countries. Complementing traditional monetary-based poverty measures, the MPI assesses poverty at the individual level: if someone is deprived in a third or more of ten (weighted) indicators, the global index identifies them as 'MPI poor', and the extent – or intensity – of their poverty is measured by the percentage of deprivations they are experiencing.[2] One caveat, however, is that for forest communities these measures do not typically so far take into account direct contributions of forest products to subsistence (e.g., for food, energy and shelter) which are poorly or wholly untracked in most population surveys. Furthermore, since many forest communities are remote and logistically difficult to access they are often under sampled in national surveys.

Rationale:

The number of forest-dependent people who are poor is an indicator of the importance of forests for social well-being, and of the level of deprivation among populations dependent on forest resources. While there is a wealth of data on the state of the physical resources of forests, data and analysis on human-forest interactions, on the socio-economic and cultural benefits that people derive from forests, and in the way that different population groups interact with, manage and exploit or conserve forests is often lacking. This indicator draws attention to the levels of material deprivation of forest dependent people (including relative to other groups in the population) and on the benefits of forests for the poor and vulnerable.

Comments and limitations:

Very few countries have nationally representative surveys that adequately cover the socio-economic conditions of forest-dependent people. The problem is two-fold as it relates to both the sampling of forest dependent populations, and the information that is elicited from respondents in the type of surveys national statistical systems use to measure poverty. Unless forest dependence is widespread throughout a

[1] Besides using a different threshold than the IPL, national poverty lines might also refer to relative measures of poverty whereas the IPL is defined as a measure of absolute poverty (REFERENCE).

[2] The Global Multidimensional Poverty Index (MPI) was developed within the Oxford Poverty & Human Development Initiative (OPHI), https://ophi.org.uk/multidimensional-poverty-index/ FAO has established a partnership with OPHI to work jointly on a global, multidimensional measure of rural poverty (http://www.fao.org/3/ca4811en/ca4811en.pdf)

nation, a sampling of the general population is unlikely to yield the data required to make valid inferences about the forest-dependent subset of the population, however defined. Also, the general-purpose questionnaires usually do not include specific information on the use and benefits of forest resources that may be required to assess dependence from forests (see FAO *et al.* 2016) for a full discussion). Addressing these issues requires targeted efforts and an active collaboration at the sampling and survey design stage on the part of and between National Statistical Offices and Forestry Departments. Relying to the extent possible on remotely sensed information and on modelling is likely to be a promising avenue for filling some of the information gaps, but one that will require further methodological research before it can be applied at scale.

Methodology

Computation Method:

The number of forest dependent people in extreme poverty can be computed by applying the poverty measure of choice to the population defined as forestry dependent. based on the alternative definitions proposed above, it could be computed as the number of people living on less than USD 1.90 a day residing in or around forests (proximity dimension only), or it could be defined as the number of people living on less than 1.90 a day, residing in or around forests *and* earning more than X percent of their income from forest-related activities (proximity and reliance dimensions jointly).

If survey data on poverty and income sources representative of the forest dependent population are available, the indicator can be derived directly from survey data. If the survey data do not provide enough geographic granularity to allow the computation of the indicator directly, this could be computed via modelling by combining survey data with Census and/or remotely sensed information. The computation guidelines for extreme poverty according to the national and international definition are well established and are included in the SDG metadata for indicators 1.1.1 and 1.2.1 (see Box). The computation of an index for forest dependency will be derived once a definition has been agreed upon.

In the latter case will have to be derived and tested to combine different spatial products. Several population and forest cover spatial data sources exist which are listed in the next section. The two can be overlayed to derive estimate of the forest dependent population along the proximity dimension. Adding a further layer along the income dimension and one for poverty will imply increasing complexity and computational challenges that need to be assessed in full. This is particularly challenging because it is not sufficient to overlay a poverty map to a forestry dependency map to arrive at the rate at the number of forest dependent poor people, unless one is ready to make and accept the simplifying assumption that the poverty rate within a given geography is equally distributed across the forest dependent and the general population.

BOX - Computation guidelines for extreme poverty according to the national and international definition from the SDG indicators 1.1.1 and 1.2.1 metadata

International Poverty Line

To measure poverty across countries consistently, the World Bank's international measures apply a common standard, anchored to what "poverty" means in the world's poorest countries. The original "$1-a-day" line was based on a compilation of national lines for only 22 developing countries, mostly from academic studies in the 1980s (Ravallion et al., 1991). Based on a new compilation of national lines for 75 developing countries, Ravallion, Chen and Sangraula (2009) proposed a new international poverty line of $1.25 a day. This is the average poverty line for the poorest 15 countries in their data set.

The current extreme poverty line is set at $1.90 a day in 2011 PPP terms, which represents the mean of the national poverty lines found in the same poorest 15 countries ranked by per capita consumption. The new poverty line maintains the same standard for extreme poverty - the poverty line typical of the poorest countries in the world - but updates it using the latest information on the cost of living in developing countries.

When measuring international poverty of a country, the international poverty line at PPP is converted to local currencies in 2011 price and is then converted to the prices prevailing at the time of the relevant household survey using the best available Consumer Price Index (CPI). (Equivalently, the survey data on household consumption or income for the survey year are expressed in the prices of the ICP base year, and then converted to PPP $'s.) Then the poverty rate is calculated from that survey. All inter-temporal comparisons are real, as assessed using the country-specific CPI. Interpolation/extrapolation methods are used to line up the survey-based estimates with these reference years.

National Poverty Line

The formula for calculating the proportion of the total, urban and rural population living below the national poverty line, or headcount index, is as follows:

$$P_0 = \frac{1}{N}\sum_{i}^{N} I(y_i < z) = \frac{N_p}{N}$$

$$=1$$

Where $I(.)$ is an indicator function that takes on a value of 1 if the bracketed expression is true, and 0 otherwise. If individual consumption or income y_i is less than the national poverty line z (for example, in absolute terms the line could be the price of a consumption bundle or in relative terms a percentage of the income distribution), then $I(.)$ is equal to 1 and the individual is counted as poor. N_p is the total, urban or rural number of poor. N is the total, urban or rural population.

Consumption or income data are gathered from nationally representative household surveys, which contain detailed responses to questions regarding spending habits and sources of income. Consumption, including consumption from own production, or income is calculated for the entire household. In some cases, an "effective" household size is calculated from the actual household size to reflect assumed efficiencies in consumption; adjustments may also be made to reflect the number of children in a household. The number of people in those households is aggregated to estimate the number of poor persons.

National poverty rates use a country specific poverty line, reflecting the country's economic and social circumstances. In some case, the national poverty line is adjusted for different areas (such as urban and rural) within the country, to account for differences in prices or the availability of goods and services. Typically the urban poverty line is set higher than the rural poverty line; reflecting the relatively higher costs of living in urban areas.

Disaggregation:
No further disaggregation of this indicator.

Regional aggregates:

When the information is available for all countries and territories, regional and global estimates are produced by summation.

Data Sources

Poverty and Forest Income

The survey data typically used for poverty estimation include: Household Income and Expenditure Survey (HIES), Household Budget Survey (HBS), Living Standard Measurement Study (LSMS) and Integrated Household Surveys (IHS). Other potential future sources of survey data include the data that will be produced by new 50x2030 initiative to the extent that they will collect data on poverty and forest dependence (income). Several but not all the survey that collect poverty data also collect income data.

Population and forest cover

Population censuses are the main source of population data. Since the frequency of census is at least every decade and household surveys offer representativeness at a limited number of geographic areas, high resolution spatial data and statistical models enable the mapping of characteristics like population down to the small area level. Statistical approaches, such as dasymetric modeling, interpolation, cross-entropy, machine-learning and small area estimation, can help address the problem of providing feasible estimates for smaller geographical areas, while explicitly acknowledging uncertainty associated with the estimates.

Several recent efforts deploying these methods have produced global- and continental-extent gridded population data (Leyk et al. 2019). Gridded population data have the desirable property of a consistent unit of area, which can facilitate data integration with other spatial data (e.g Tobler et al. 1997, Liverman et al. 1998, Balk et al. 2006).

Potential data sources for spatial data on forest cover include:

Product	Spatial resolution	Temporal coverage	Contents / overall reported accuracy	Source
Global 100m Land Cover maps for 2015	100 m	2015	23 classes, 80% overall accuracy	https://land.copernicus.eu/global/products/lc
Global forest change	30 m	Annual (2000-) for forest area and losses	Forest canopy cover %, gains, losses/ unknown	University of Maryland https://earthenginepartners.appspot.com/science-2013-global-forest/download_v1.5.html
Landsat Tree Cover	30 m	2000	Percentage cover/ unknown	Global Land Cover Facility, University of Maryland http://glcf.umd.edu/data/landsatTreecover/

Continuous Fields				
Landsat Forest Cover Change	30 m	Annual (2000-)	Forest)/ unknown	Global Land Cover Facility, University of Maryland http://glcf.umd.edu/data/landsatFCC/
Forest and non-forest global map	25 m	Every year 1993-1998, 2007-2010, 2015-2016	Two classes (forest/non-forest)/ 84% accuracy /L-band SAR	Earth Observation Research Center, Japan Aerospace Exploration Agency http://www.eorc.jaxa.jp/ALOS/en/palsar_fnf/fnf_index.htm

Sources for global spatial data on population include (adapted from Table 1 in Leyk et al. 2019):

Product	Spatial resolution	Temporal coverage	Population concept	Method	Source
Gridded Population of the World (GPWv4.11)	1 km	2000; 2005; 2010; 2015; 2020	De jure / de facto	Areal weighting	http://sedac.ciesin.columbia.edu/data/collection/gpw-v4
LandScan Global Population Database (Landscan Global)	30 arc seconds	Annual releases (2000-2016)	Ambient (day-time)	Smart interpolation	https://landscan.ornl.gov/
WorldPop	100 m	2000-2020	De jure / de facto	Statistical / dasymetric	www.worldpop.org
Global Human Settlement Layer – Population (GHS-POP)	30 m	1975; 1990; 2000; 2015	De jure / de facto	Daysmetric refinement, proportional to built-up density	http://ghsl.jrc.ec.europa.eu/ghs_pop.php

Data Availability (challenges)

Description:

No country currently routinely report on the number of forest dependent people in extreme poverty.

The World Bank recommends that **poverty data** be produced with a periodicity of at least three years. Despite this, substantial data gaps persist. Serajuddin et al. (2015) noted that "During the ten year period between 2002 and 2011, among the 155 countries for which the World Bank monitors poverty data using the WDI database, 29 countries do not have any poverty data point and 28 countries have only one poverty data point. Thus, in over a third of the world's developing or middle-income countries there is essentially no meaningful way of monitoring poverty or shared prosperity for that specific period. Moreover, among countries that have poverty estimates for two years over the ten-year period, often large time gaps exist.

Of 35 such countries, 20 have two poverty estimates with a larger than five year interval, which resulted in poverty monitoring efforts being dated. Therefore, a total of 77 countries – about half of the 155 countries – faced challenges in producing timely or any poverty estimates during the 2002-11 period. If one considers intervals shorter than 5 years, the picture becomes worse".

Several types of surveys collect information on **forest income** but they vary in design and coverage. A review of the extent to which surveys cover the socio-economic aspects of forests including income is Russo et al. (2014). The review concludes that "LSMS are multi-topic surveys and have limited coverage of forest-related data. Agricultural censuses cover all aspects of the agricultural production systems in a country, including some forest-related data. NFMA, all FAO-FIN supported country inventories, PEN and IFRI surveys specifically focus on forests. In the category of forest specialized surveys, NFMAs are those with the widest coverage of non-forest variables and have taken the form of integrated land use assessments in some countries. PEN also has many non-forest variables, as it collected to calculate total household income. In terms of in-depth coverage of household-forests relationships, IFRI surveys are the most detailed and the LSMS the least." FAO et al. (2016) constitutes an attempt to promote the collection of forest and livelihoods data in nationally representative surveys. To date versions of the questionnaire have been implemented in Turkey, Georgia, Armenia, and Liberia.

Unless forest-dependent populations are widespread within a country, the surveys typically used for poverty analysis will not allow making valid inferences for the forest-dependent sub-populations. This will require purposeful efforts to insure sampling the forest dependent populations.

There is little reliable data on forest-dependent people.[3] The estimates of forest-dependent people at global and/or national levels by different studies and organizations are based on different definitions, understanding and assumptions.[4] The availability of spatial data on both forests and people is rapidly increasing and can likely play an important role in contributing to the monitoring of the indicator. Sunderlin et al. (2007) is an example at an approach to integrating household, census and forest cover data to gauge the association between forest cover and poverty in Brazil, Honduras, Malawi, Mozambique, Uganda, Indonesia, and Vietnam.

Calendar

Data collection:
For survey data, the schedule of source collection is determined by the country governments. Some are annual, and most others are less frequent.

Data release:

Data providers

National Statistical Offices (NSOs) of all countries and areas, supported by

[3] It is noteworthy to quote a study done in 2000 by Calibre Consultants and the Statistical Services Centre (SSC) of the University of Reading (2000) for the Department for International Development of the United Kingdom (DFID) *"…. as a result of the interviews carried out for this study and examination of a variety of sources in the materials collected, we have had to conclude that there are no reliable regional or international sources of data on forest-dependent people…"* (p. 11).

[4] Chao (2012) has compiled national forest-dependent people estimates from studies that were published from 1994 to 2011. This compilation shows how estimates vary widely depending on definitions adopted and data sources utilized.

Forestry Departments or equivalents of all countries and areas as well as remote sensing data on forest cover from one or more sources listed in table above.

Data compilers

TO BE DISCUSSED

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