Indicators for Sustainable Development at the Level of Rural Municipalities – Case Studies: Gagnef and Vansbro (Dalarna, SE)

von

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Abstract

Indicators contribute to a great extent to the understanding and communication of sustainability. Further work on this is necessary to enhance the public's and decision maker's comprehension. The 20 indicators presented here focus on the local level of rural municipalities, which is often neglected by the ongoing development of these indicators. Official statistics were used as data source. The indicators were tested and applied to the two Swedish municipalities Gagnef and Vansbro. Three indicators are presented to give examples of the indicators structure and discussion.

Zusammenfassung

Indikatoren leisten einen großen Beitrag zu dem Verständnis und zur Kommunikation von Nachhaltigkeit. Es ist notwendig diese Arbeit fortzuführen, um das Verständnis in der Öffentlichkeit und von Entscheidungsträgern weiter zu fördern. Die 20 Indikatoren, die hier vorgestellt werden, legen den Fokus auf die lokale Ebene von ländlichen Kommunen, welche in der anhaltenden Entwicklung dieser Indikatoren oft übergangen wird. Als Datenquellen wurden offizielle Statistiken genutzt. Die Indikatoren wurden getestet und angewendet auf die beiden schwedischen Kommunen Gagnef und Vansbro. Die Struktur und Diskussion der Indikatoren wird an drei Beispielen vorgestellt.

1 Introduction

The United Nations Conference on Environment and Development 1992 in Rio de Janeiro motivated many different institutions to devise indicators for sustainable development for international, national and regional levels. However, the vast amount of already existing indicators often neglects the local level of a municipality or community. Studies on sustainable development at this level are rare. The road map on sustainable development for the 21st century, Agenda 21, requests in chapter 28 all local authorities to develop local sustainability concepts (UNITED NATIONS 1992). The well known slogan 'think global, act local' summarises this intention accurately. Indicators, which measure sustainability, are well-established and approved instruments of environment and sustainability policies (NLÖ 2004). So the 'think global' slogan part is widely covered, but the 'act local' aspect lacks attention. Indicators for the local level could help to fill these gaps. This study contributes to the discussion about sustainability indicators for the often neglected local level of rural municipalities. The indicators presented here are based on a set of indicators developed by ZENNER (2007) for two communities on the Isle of Lewis on the West Coast of Scotland. This existing set was applied to municipalities in Sweden to test their transferability to other rural regions with the aim to create a generally applicable set. Indicators which could be implemented in different regions could facilitate the comparability of regions. This aspect gains importance on an European level, since European regions are engaged in an increasing 'competition of regions' (MOSE 2005).

Sustainability is defined here as lasting well-being of a community in terms of social life, social equity as well as local economy within a healthy natural environment, and without damaging any goods or services (ZENNER 2007, p.3).

2 Methods

2.1 Choice of case study municipalities

Rural areas are characterised by a wide variety of factors. Thus, the choice of case study municipalities was based mainly on their population density, as an objective criterion, and their level of periphery. The population density had to be approximately 9 inhabitants per km², which corresponds to the average Scottish population density (ZENNER 2007). The two adjacent Swedish municipalities Vansbro (4.5 inh./km²) and Gagnef (13.1 inh./km²) fulfil the criteria best and were chosen as case studies. Gagnef and Vansbro are located in the south-western part of Dalarna county, Sweden (see fig. 1 and 2).

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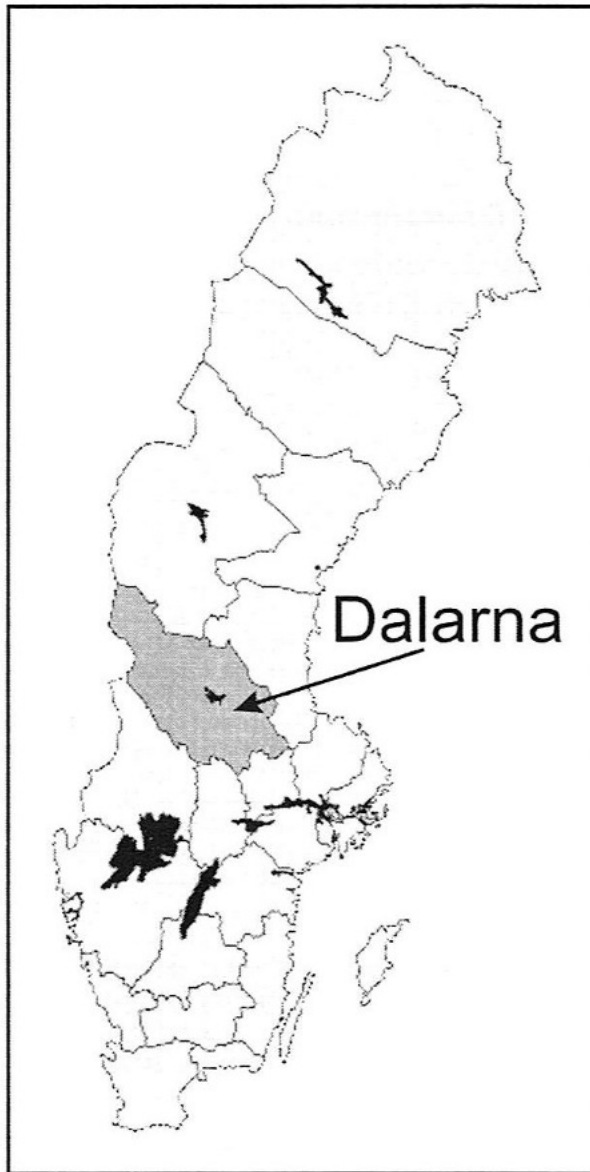
Fig. 1:   Map of Sweden

Fig. 2:   Map of Dalarna

2.2   Choice of Indicators

The choice of indicators was mainly influence two factors: theoretical requirements and pragr deliberations. Additionally, other existing indic sets were consulted to identify parameters, w are recognised as being important for sustain development.

A self-evident selection criterion was, that indicators need to be informative and relevan terms of sustainable development. The selec of factors indicating sustainable developmen a rural municipality was guided by the underl sustainability definition of the thesis.

For each of the four strands of sustainability (table 1), five indicators, some with sub-indicat were developed. The total number of 20 indica meets a requirement, which is frequently reque for indicator sets: The limited number of indica (BALTIC21 2000; HAMETNER & STEURER 2(NLÖ 2004). This aspect is important for indica in order to truly summarise complex topics. A l list of indicators could reinforce the impress of sus tainability as being a highly complex therefore not comprehensible theme. This w contradict a main function of indicators to cl and simplify information (MINEUR 2007), and w thus be counter-productive.

In order to select sound indicators, these sh also fulfil general requirements, such as:

- validity – be robust and statistically valid

- comparability – enable comparisons in and space

- availability and timeliness – be based on a able data, ideally on time-series

- responsiveness – respond quickly and tice able to changes

- representativeness – capture the essenc its topic

- stability and reliability – compilation of da done with systematic and reliable metho

(own compilation after BESLEME et al. 1￼ LEDOUX et al. 2005, NLÖ 2004, ZENNER 20

For the choice of indicators, also practical cor erations were taken into account. The use of off statistics as primary data source was determ before the selection and application of indicat Therefore, the availability of data was a cru prerequisite for the choice of indicators.

pragmatic approach is frequently found in studies about sustainable development indicators, using official statistics as primary data source (BALTIC21 2000; LEDOUX et al. 2005; STATISTCS SWEDEN 2001).

2.3 Data acquisition

In order to develop a set of indicators that is easy to apply and to repeat in the future as well as in other municipalities, official statistics were used as data sources. The term 'official statistics' is interpreted for this study as statistics provided by public agencies. It is assumed that these agencies produce accurate and reliable statistics, important features of data chosen to serve as base for indicators. Another important aspect was, that statistics provided by public agencies are most likely to be easily available at no cost or for a low fee. Furthermore, the use of already existing statistics helps to avoid "multiple reporting and double work of compiling and assessing data" (BALTIC21 2000, p. 9). Official statistics served as data source for several existing indicator sets (BALTIC21 2000; AGENDA TRANSFER 2003).

To cover the many different aspects of sustainability indicators, official statistics were needed from a variety of Swedish public agencies. All statistics used were available free of charge and easily accessible, mainly over the Internet. The good accessibility of official statistics in Sweden is based on 'the principle of public access to official records'. This means, that Swedish public agencies have to grant access to their records, which happens more

and more over the Internet. This principle is unique for Sweden (ARL 2001).

Supplementary information sources were semi-structured interviews, which were conducted between May and October 2008. The interviewer asked explicitly for the interviewee's opinion, regarding the list of indicators, which was given to the interviewees. Also, qualitative informations about the municipalities of the case study and other indicator systems in Dalarna were obtained. Some interviewees also provided quantitative data for certain indicators.

For the selection of interviewees, two methods were used. First, key actors from the two case study municipalities and public agencies, like the County
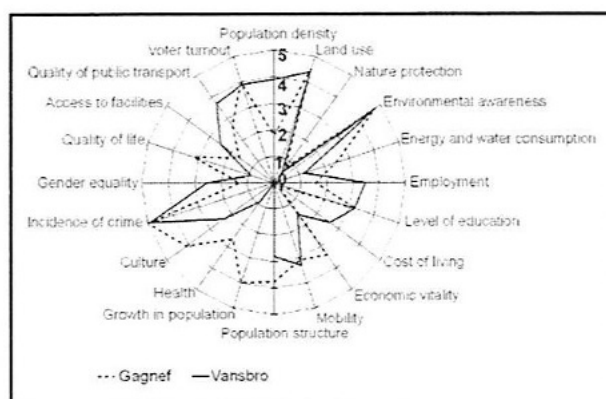

Fig. 3:   Local sustainability of the study areas - results for all indicators, divided by municipality

Tab. 1:   Set of indicators, divided into the four strands of sustainability

Environment	Economy	Society	Social Equity
1. Population density	1. Employment • Unemployment • Economic diversity	1. Population structure	1. Gender equality • Leading positions • Income differences between gender
2. Land use	2. Level of education	2. Growth in population	2. Quality of life
3. Nature protection • Biodiversity • Nature protection area	3. Cost of living	3. Health • Sick-leave rate • Life expectancy	3. Access to facilities
4. Environmental awareness • Use of fertiliser • Resource saving measures • Waste separation	4. Economic Vitality • New businesses vs. Bankruptcies • Commuting habits	4. Culture • Municipal expenditures • Cultural events	4. Quality of public transport
5. Energy- and water-consumption • Energy consumption • Water consumption	5. Mobility • Car ownership • Internet access	5. Incidence of crime	5. Voter turnout

Administrative Board Dalarna, were identified based on their position or experience with indicators of sustainable development. Second, existing contacts gave information and recommendations which helped to identify further contact persons ('snowballing method') (HAY 2005).

3   Results

The 20 selected indicators are listed in table 1. Three indicators are presented below to give examples of the indicator's structure and discussion (see 3.1).

An assessment scale was developed for each indicator. If an indicator is divided in sub-indicators, they are assessed separately. The average of these separate results forms the indicator's total score. The assessment scales reach from 0 to 5 points. Five points were defined to be the best and zero the worst result. For most scales a reference value was used for dividing them reasonably. This reference value is often the average of all municipalities in Dalarna. Figure 3 shows all results for both case studies.

Examples of Indicators

Environment > Environmental awareness > Resource Saving Measures

The indicator 'Resource Saving Measures' deals with the use of non renewable resources. The majority of exploited resources are not renewable, at least not in human time frames. Their use should be limited to insure sustainable development (NLÖ 2004).

The amount of extracted natural gravel is examined as an example of non renewable resource use. A reduced production of natural gravel is part of Dalarna's Environmental Goals. In 1997 the aim of a 50 % reduction until 2010 was defined (COUNTY ADMINISTRATIVE BOARD DALARNA 2007). Therefore, figures from 1997 and 2007 were compared and the difference expressed as percentage of the production in figure from 1997. A reduction of 50 % is defined to equal 5 points. The average reduction for all production units in Dalarna is used as reference value, equal to 2.5 points.

The second highest amount of natural gravel in Dalarna was produced in Gagnef in 2007. Its six mines extracted 153,765 tons during that year. This fact makes the reduction of about 50 % over the last ten years even more remarkable. Vansbro's three mines extracted 665 tons in 2007, which is negligibly compared to Gagnef's production. The average reduction in Dalarna sums up to about 41 %, which indicates that Dalarna's Environmental Goals might be reached until 2010.

Society > Population Structure

The percentage of young and old inhabitants as well as gender ratio is covered by the indicator 'Population Structure'. A well-balanced population in regard to these aspects is important to keep a municipality viable and to ensure sustainable development. This is especially true for rural areas, since younger persons tend to leave these regions due to a lack of perspectives and job opportunities.

Figures for Dalarna were taken as reference (=2.5 points), because it is assumed that they represent a healthy pattern. The total score is composed to equal parts of three aspects: percentage of population between 0 and 14, percentage of population over 65 years of age and gender ratio. High numbers of young persons, low numbers of elderly persons and an even gender distribution result in a high score.

Both case studies receive a high score for their gender ratio. Their population consists of almost equal parts of men and women. Vansbro has about the same amount of inhabitants between 0 and 14 years of age (15.78 %) as Dalarna (15.67 %). Gagnef on the other hand has with 18.05 % more young people than Dalarna's average. The opposite is true concerning the percentage of inhabitants over 65 years of age. In Gagnef live slightly less elderly persons (19.09 %) than on average in Dalarna (20.29 %). In contrast to that, more inhabitants in Vansbro are older than 65 (23.12 %). The total score for Gagnef is therefore with 3.8 points higher than Vansbro's score of 2.8 points.

Social Equity > Quality of Life

Quality of life is a very subjective matter and hard to measure. It includes aspects like family and

Tab. 2:   *Resource Saving Measures (Source: County Administrative Board Dalarna)*

points	0 (worst)	0.1 – 2.4	2.5	2.6 – 4.9	5 (best)
	30 % reduction	39 - 31 %	Dalarna's average (= 41 % reduction)	42 – 49 %	50 % reduction
results					Gagnef: 51.56 % → 5 points Vansbro: 94.08 % → 5 points

Tab. 3:   Population structure, figures for 2007 (Source: Statistics Sweden)

points	0 (worse)	0.1 – 2.4	2.5	2.6 – 4.9	5 (best)
age pattern	>5 % of 0-14 less, >5 % of +65 more than average	0.1 – 4.9 % less/more than average	Dalarna's average	0.1 – 4.9 % more/less than average	>5 % of 0-14 more, >5% of +65 less than average
gender ratio	< 0.80; > 1.20	0.81 – 0.89 0.11 – 1.19	0.90; 1.10	0.91 – 0.99 1.01 – 1.09	1.0

friends, as well as spirituality or faith for which a measurement is infeasible (BESLEME et al. 1999). Surveys including questions about quality of life can be influenced by the current mood, well-being or financial situation, which can easily change on a daily basis (ZENNER 2007). One way to avoid these possible complications can be the use of an indirect measurement, like financial security. The ability to maintain an average standard of living contributes to a great extent to the overall personal quality of life. A certain level of income is the precondition for this. No norm exists regarding which income is tolerable or desirable in a society. Thus "the idea of the relative measure is to suggest that income below 60 per cent of the median may make it difficult to maintain a level of consumption that is regarded by society as normal or to be well integrated in the community" (GOV. COM. 2005, p.83).

The statistic takes only persons with disposable income into account, which is about the same as the population aged 16 and older. Disposable income is defined as "the sum of all taxable and non-taxable income (income from employment and capital, as well as transfers), less tax and other negative transfers." (GOV. COM. 2005, p. 83). Dalarna's average sets the middle score (2.5 points). The upper and lower end of the assessment scale were set by adding and subtracting the average's standard deviation times three from the reference value.

In 2002 about 12 % of the Swedish population lived in households with income less than 60 % of the median. The EU wide comparison shows that this figure is quite low, (GOV. COM. 2005) making Sweden "the envy of many countries, because of its high standard of living" (PETERS & LARKIN 2005, p.110).

Gagnef reached a fairly good score of 3.2 points, but Vansbro scored only 0.8 points. Fewer people

in Gagnef than in Vansbro thus earn the minimal annual income (60 to 79 tkr [thousand Swedish krona]) or even less. The median annual income reflects these disparities, since it is higher in Gagnef (125.9 tkr) than in Vansbro (112.1 tkr).

4   Conclusion

The set of indicators presented here contributes to the ongoing discussion about sustainability and how to measure it. These indicators cover a wide range of different factors relevant for sustainable development in a rural municipality and are covered by official statistics.

Each indicator is equally important in achieving the goal of sustainable development. The division into four strands does not mean that they compete against each other. None of them should be developed at the expense of the other. The classification also helps to select an equal amount of indicators for every aspect of sustainability. A reasonable balance is desired to clearly illustrate the equality between all of them. Therefore, results are presented for every indicator individually and not condensed into one 'sustainability index'. To create such an index would make comparisons of regions easier, but is not sufficient for measuring sustainable development in a rural municipality.

The indicator set presented here should be seen as the second draft for widely applicable indicators for sustainable development of rural municipalities. Further revisions are needed to enhance and test the quality of these indicators. An ideal situation would be the parallel development of indicators and necessary statistics. The result should be indicators, which contribute to a better understanding of sustainability by the public and decision makers. The latter should thus be enabled to pave the way for a sustainable development.

Tab. 4:   Risk of poverty, figures for 2006 (Source: Statistics Sweden, income statistics)

points	0 (worse)	0.1 – 2.4	2.5	2.6 – 4.9	5 (best)
Percentage of inhabitants with income less than 60 % of the median	19.45 %	19.3 – 14.7 %	14.6 % (= Dalarna's average)	14.5 – 9.8 %	9.7 %
results		Vansbro: 17.7 % → 0.86 points		Gagnef: 13.17 % → 3.2 points	

5   Acknowledgements

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