Elżbieta Gończ, egoncz@gnu.univ.gda.pl
Mariusz Kistowski, geomk@univ.gda.pl

Is Polish Regional Sustainable Development Measurable ?

1. The purpose and scope of the study

The aim of the research presented in this article was to evaluate, the strategies for regional (voivod) development adopted by the regional councils in 2000 and 2001 in terms of their implementation of a range of issues relating to environmental protection and sustainable development. This aim may therefore be decribed in general terms as an evaluation of the eco-orientation of these strategies and also, in a sense, their "ecoinnovativeness", in other words the extent to which the strategies aim at implementation of sustainable development in the generally recognised sense of the term. Implicit in the main aim of the study is the realisation of a number of indirect aims and several stages in the research. These are set out in Fig. 1

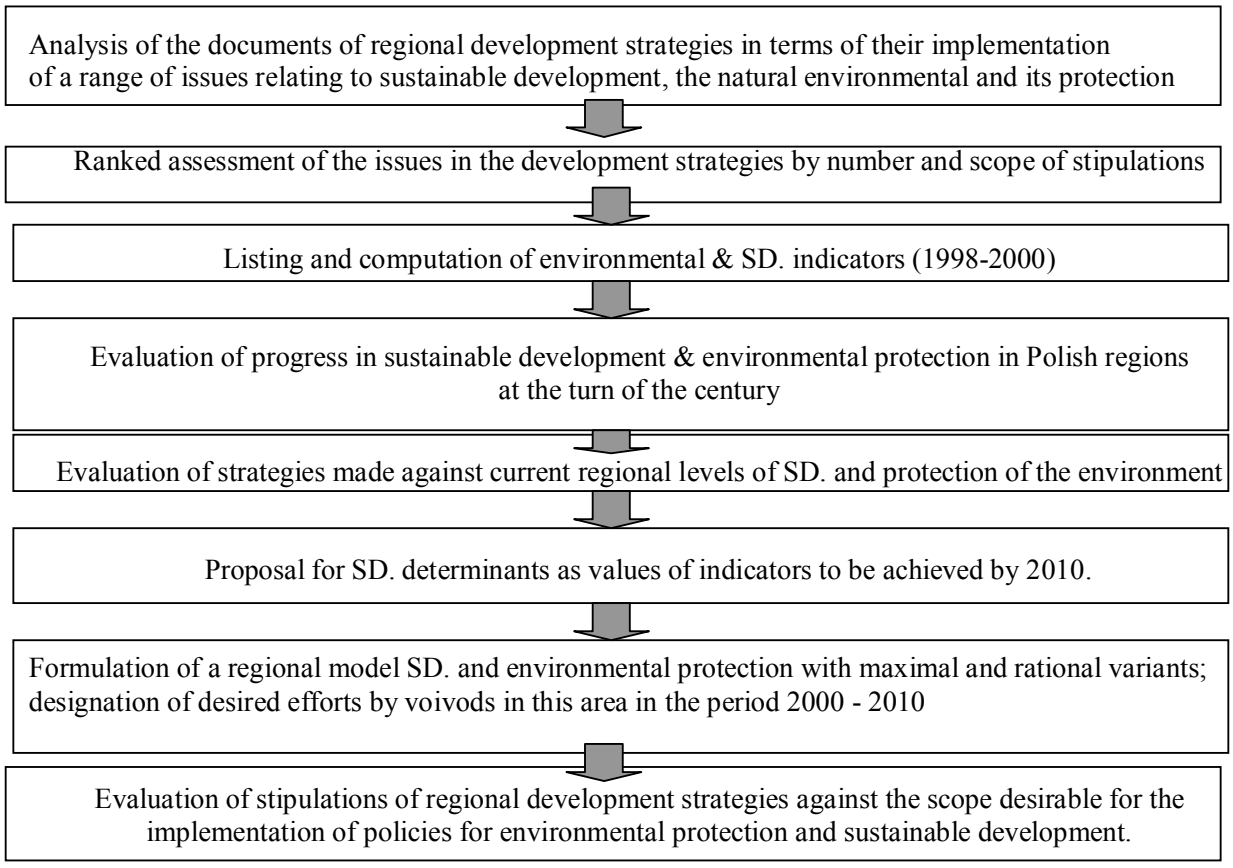
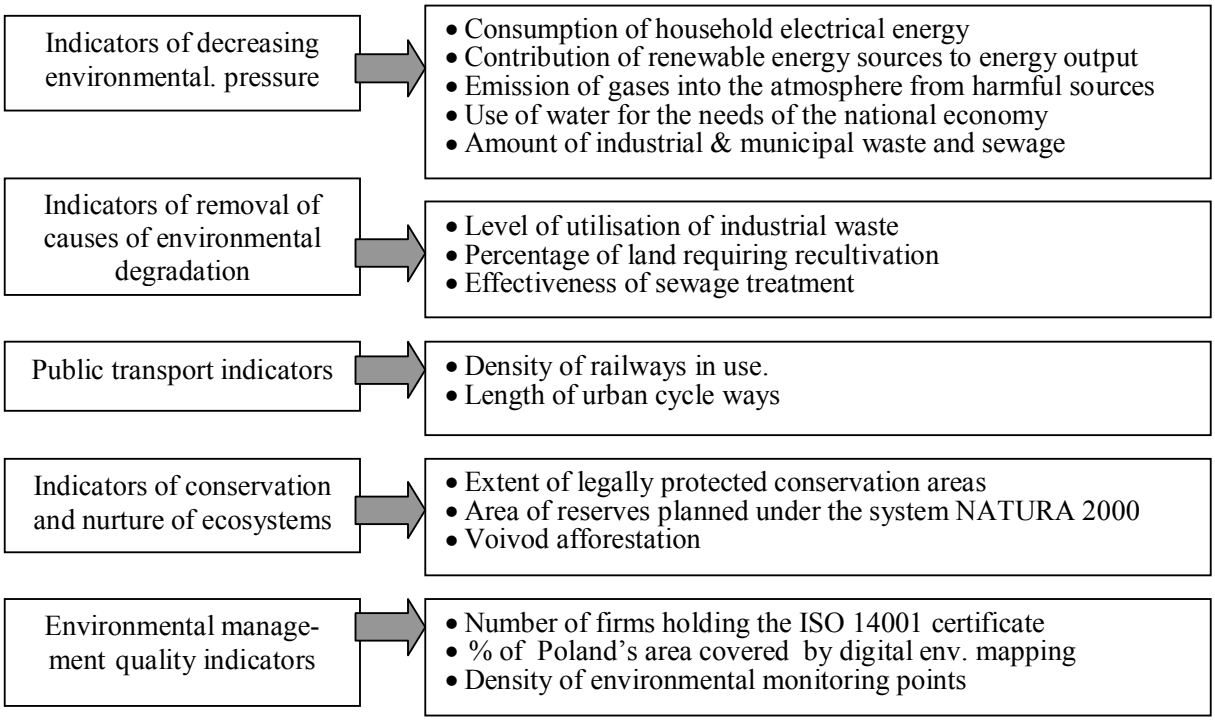


Figure 1: **Simplified scheme for the course of research into the ecoinnovativeness of voivod development strategies**

Soon after the work on the evaluation of the strategies was undertaken, it became apparent that it would not be enough to analyse quantitatively the numerous individual stipulations of the strategies (both the diagnostic and operational parts), as well as the whole range of measures. In order to achieve the aim set for the research with relative objectivity, it was necessary to carry out an indicatory analysis which would, firstly, enable the range of diagnoses (drawn up on the principles of the SWOT analysis) presented by the regions to be evaluated, and, secondly, allow an assessment to be made of the current state of progress of the regions in environmental protection and sustainable development. It was necessary, then, to identify the regional determinants for sustainable development, as the anticipated values of pre-planned indicators used in formulating a regional model of sustainable development and environmental protection. This model was worked out in two variants, the maximal and the rational. The resulting designations from the assessment of the 16 strategies have been used for comparison with the set of regional indicators as well as with the range of desired regional actions, both in environmental protection and in sustainable development. This procedure has revealed a gap between what has to be done objectively to strengthen RSD and what should be done as set out in the strategies.

2. Environmental and sustainable development indicators.

The selection of indicators was made primarily with reference to the scope of developmental strategies. They have been chosen to enable the stipulations of the strategies to be evaluated. 17 indicators were used to evaluate the SWOT analysis in the strategies. 22 indicators have been used to evaluate the range of strategic tasks planned, most of which may be recognised as indicators of sustainable development (Fig.2).



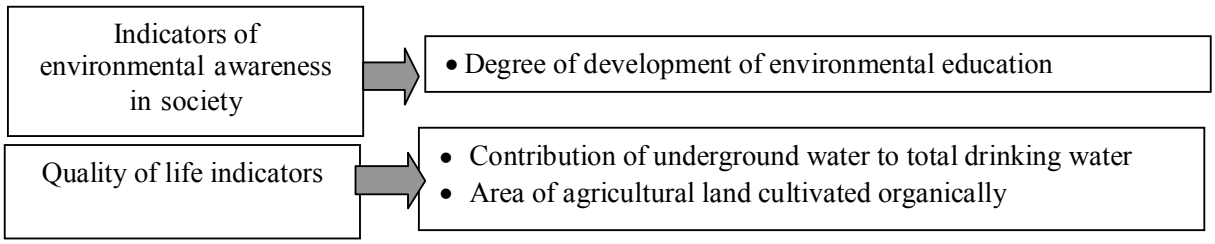


Figure 2 : **Selected indicators of sustainable development used for the assessment of regional strategies**

As some of the indicators have been applied in the evaluation of both parts of the strategies (diagnosis and goals), they total 35 in all. All belong to one of three groups of indicators, classically distributed with respect to their bearing on the natural environment, i.e. indicators of state, pressure and response. The indicators have also been divided into static and dynamic (slow and quick to change). However, owing to a lack of data, it was not possible to determine the rate of change for all the dynamic indicators analysed, in particular for the years 1998 - 2000 and, in a few cases, 1995 – 2000. The values calculated for the indicators have been divided into five classes, particular attention being given to the indicators of pressure on the environment and of response to this pressure (Fig. 3 – next page).

The spatial schedule presented in Fig.3 points to the most favourable situation with regard to the indicators of sustainable development in the following voivods: *Pomorskie*, *Warminsko-Mazurskie*, *Lubuskie*, *Podkarpackie* and *Dolnoskaskie*. The following regions are characterised by a clearly unfavourable situation: *Lodzkie*, *Mazowieckie* and W*ielkopolskie*. The lack of concerted effort in support of environmental protection and sustainable development gives particular cause for concern in the central and eastern regions of Poland. The diagnosis goes some way toward discrediting the traditional stereotype of southern Poland as the part of the country which fares worst in terms of ecological criteria. While the true quality of the environment must still be reckoned as one of the poorest in the country (although with respect to some parameters the central regions are even worse), yet the response to its problems has been robust and gives reason to hope for an improvement in the situaton. This contrasts with the often non-environmentally friendly stance taken by communities in the regions recognized hitherto as the most environmentally unpolluted, for example *Lubelskie* and *Podlaskie*.

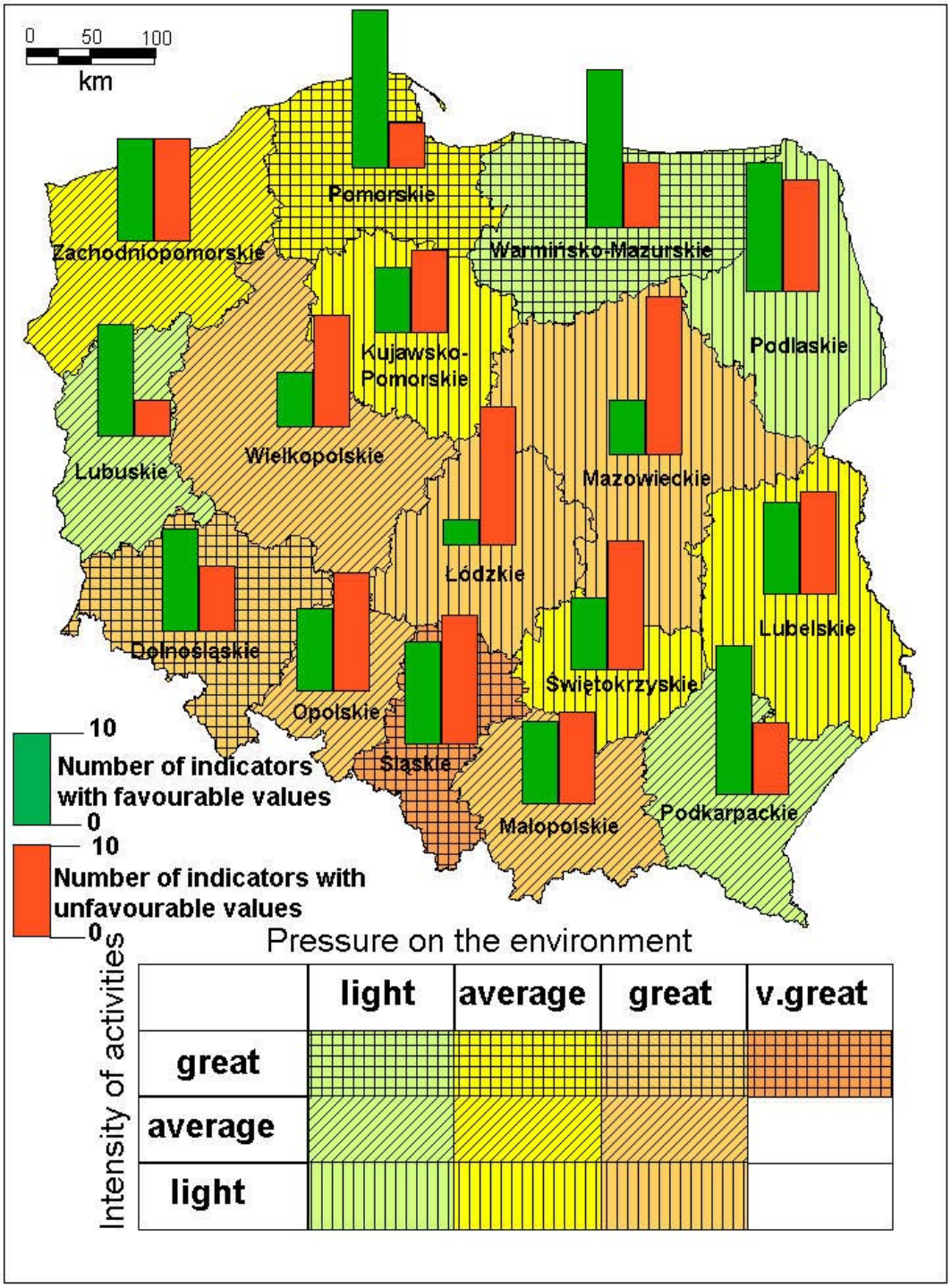


Figure 3: **Numbers of indicators with the most and the least favourable values in relation to the classification of voivods according to intensification of pressure on the environment and the degree of progress made in environmental protection**

The indicatory analysis reveals the state of progress of the regions in carrying out measures for the protection of the environment and achieving the goals of sustainable development. This may be expressed in the form of a model of the responses of the voivods to the challenges of eco- and sustainable development. (Fig. 4)

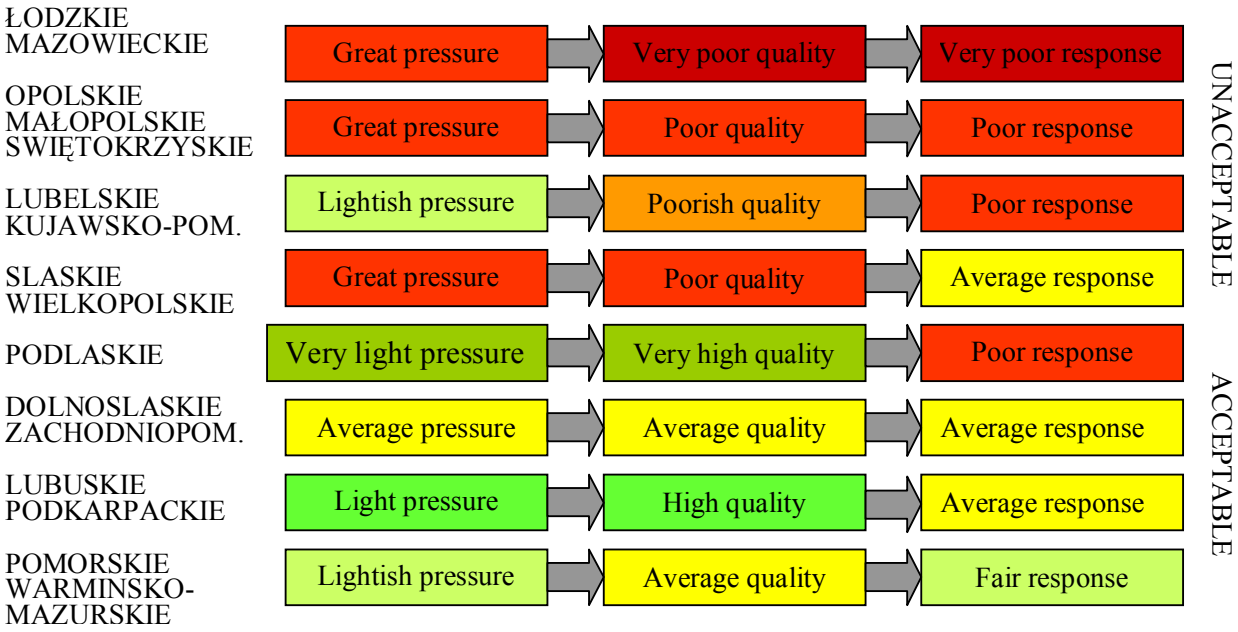


Figure 4: **Models of voivods' response to regional environmental and sustainable development issues**

The indicators used in the research also serve to analyse the dynamic changes emerging at a time of increased pressure on the environment, its quality and measures to protect it. The widespread view that the natural environment improved in every respect during the nineties in Poland, resulting in a decrease in environmental pressures, is in fact only partially true. Several manifestations of pressure on the environment, for example the use of household electrical energy and the use of artificial fertilisers in agriculture (Fig. 5 – next page), indicate a distinct increase, which may be casuing a deterioration in air quality and the quality of surface and underground water.

However, the most disturbing sign of unsustainable development in the country, standing out ever more starkly in the second half of the nineties, is the way in which expenditure on environmental protection and related causes plummeted. Between 1998 and 2001 it fell by half in some regions (*Pomorskie*, *Slaskie* and *Malopolskie*) (Fig. 6), while in the country as a whole it fell by over 30%. Such a dramatic drop in expenditure, in absolute terms as well as when reckoned in terms of population, mainly a result of a general financial crisis of the state, cannot be justified either with respect to reducing the pressure on the environment or where improvement in its quality is concerned.

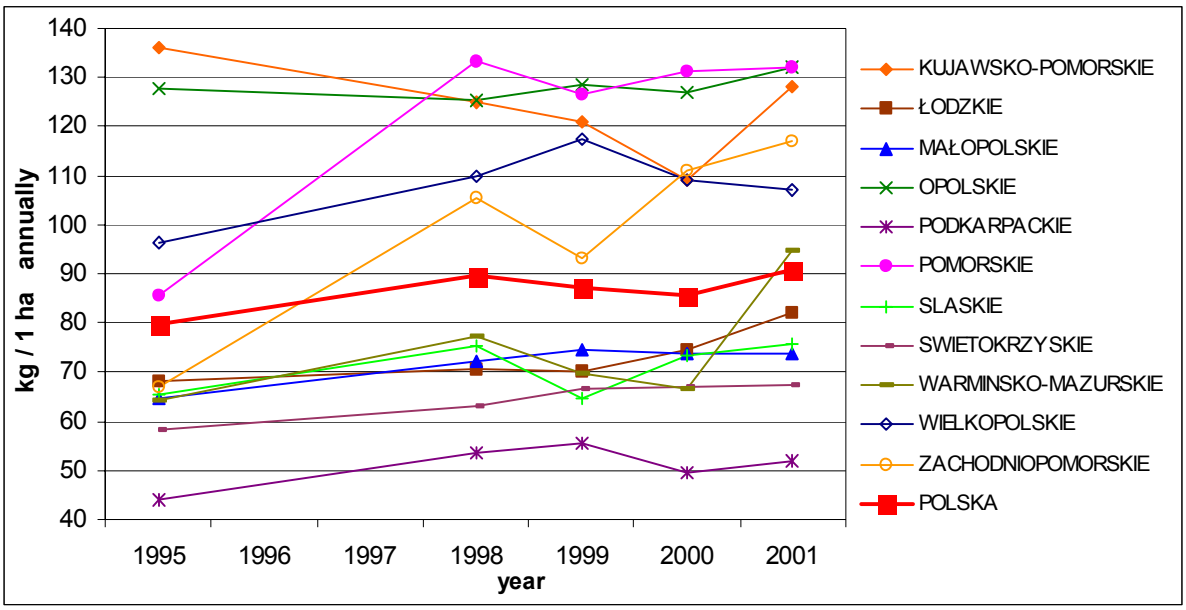


Figure 5: **Changes in the use of artificial mineral fertilisers (NPK) of pure constituents in selected voivods and in the country as a whole for the period 1995-2001**

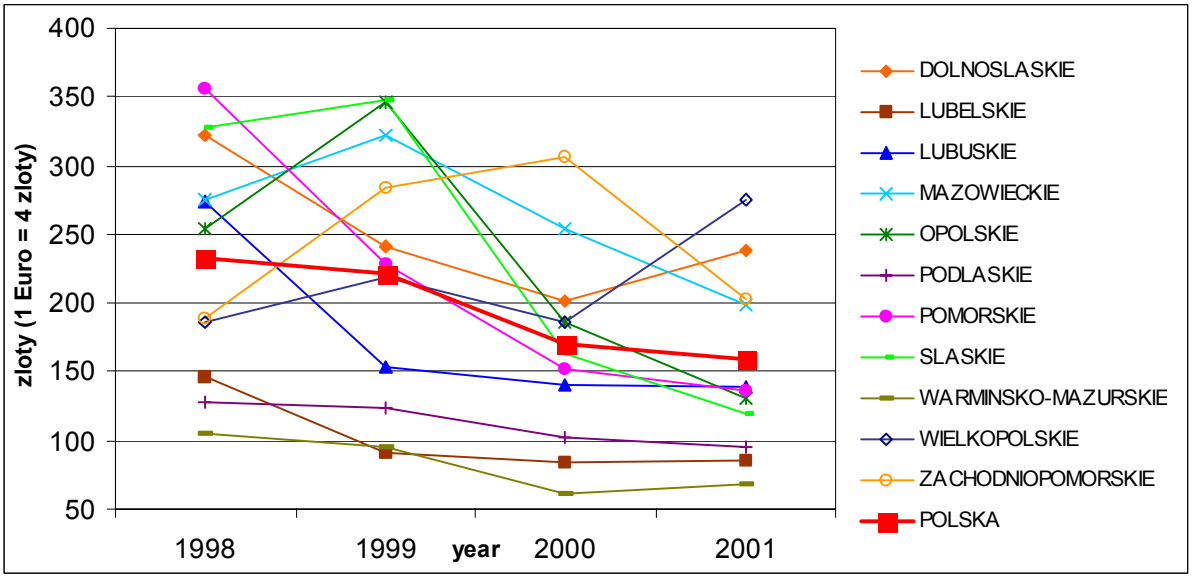


Figure 6: **Changes in the level of investment expenditure (current prices) on environmental protection per head of the population in selected voivods and in the country as a whole in 1998 - 2001**

3. A model for sustainable development and environmental protection and regional environmental policies.

In order to assess the appropriacy of the stipulations of the developmental strategies in the field of environmental protection and sustainable development, the aims for the environment and sustainable development have to be identified for specific regions. To this end a model for environmental protection and sustainable development has been drawn up. The Second National Policy for Ecology, the European Union New Policy for Environmental Protection, the concepts of "ecogrowth", such as Factor 4 and Factor 10, and of Ecological Space are, as a rule, adequate instruments to describe these aims at national level or at the level of a national grouping. On the basis of these sources and the authors' own studies, the priority was to define the values for the indicators of sustainable development, namely the values for the indicators that are desirable to achieve before a set time limit in the country as a whole. The time horizon was set at the year 2010, while treating as starting values the indicators worked out for the year 2000. Taking into account that from the point of view of long-term sustainable development, this time span is somewhat short, this date was chosen in relation to the average distance of the time horizons of the regional strategies, which range from a few years to over ten. The values for the SD. indicators for the country as a whole were calculated for fifteen out of over thirty which were adopted in the research (Table 1). For the remaining indicators, in particular those concerning environmental management and education, it was not possible to identify the specific anticipated values for the determinants, but it can be asserted that in all likelihood they should be subject to improvement in all regions.

Specification of rsd indicators	Value 2000 (x)	Value 2010 (y)	y / x Poland
Reduction in household energy use (per capita-KWh/year)	662.8	331.4	0.5
Increase in energy output from renewable sources (%)	6.71	13.00	1.94
Reduction in emissions of gases into the atmosphere (per capita-ton/year)	5.27	3.375	0.64
Increase in the density of railways in use (km/100km^2)	7.2	8.0	1.11
Reduction in the use of water in the national economy and households (per capita-m^3/year)	269.4	199.0	0.74
Reduction in the release of sewage into water and soil (per capita-m^3/year)	64.7	64.7	1.00
Increase in general level of sewage treatment (%)	87.9	94.0	1.07
Reduction in the area of land requiring recultivation (%)	0.23	0.1	0.43
Increase in the utilisation of industrial waste (%)	76.9	88.5	1.15
Increase in the extent of legally protected conservation areas (%)	32.5	33.3	1.025
Increase in the area of reserves under the system NATURA 2000 (%)	13.3	15.0	1.11
Increase in woodland and green areas (%)	29.17	30.0	1.03

Increase in drinking water derived from underground sources (%)	63.03	80.0	1.27
Area of agricultural land cultivated organically (%)	0.063	10.0	159.0
Increase in the area of coverage by digital environmental maps	0.444	1.0	2.25

Table 1. **Anticipated mean values for SD. and environmental protection indicators for Poland in 2010**

The basic issue of the research at this stage was fixed upon as defining the values of the determinants given in Table 1 for each of the 16 voivods. To resolve this problem, a model was constructed with two variants, a maximal and a rational. In the outworking of this the programme Matlab v.6 was used. The maximal variant of the model establishes that by 2010 there is a level of achievement in each region equal to at least the average for the determinants for the country as a whole for the year 2010. This is, however, not very realistic and may be referred to as the "benchmark", or the values which should be aimed at in the second variant of the model, the rational. Efforts have been made here to make the "endeavours" to be undertaken by particular regional communities more evenly distributed between the voivods than is the case in the maximal variant. This was done by employing the procedure of minimising the sum of the deviations of a determinant value in particular voivods from the mean value for that determinant in the country as a whole. The fundamental prerequisite remains, however, to determine the mean value for a national determinant in 2010, although the regional determinants may vary from one voivod to another.

In Fig. 7 four examples are given of desired changes in absolute values for parameters of sustainable development between 2000 and 2010, calculated for the rational variant of the model. The gauge of the intensity of effort which should be made in specific regions is the difference between the absolute values for a parameter at these dates (presented in bars in Fig. 7). So, for example, if the amount of energy produced from renewable sources is to be increased by a similar degree in all voivods, the reduction in the emission of gases should already be distinctly greater in *Lodzkie* and *Slaskie* and slightly greater in *Dolnoslaskie*, *Wielkopolskie* and *Mazowieckie*. A reduction in the use of water is of fundamental importance to *Mazowieckie*, *Swietokrzyskie*, *Wielkopolskie* and *Zachodniopomorskie*.

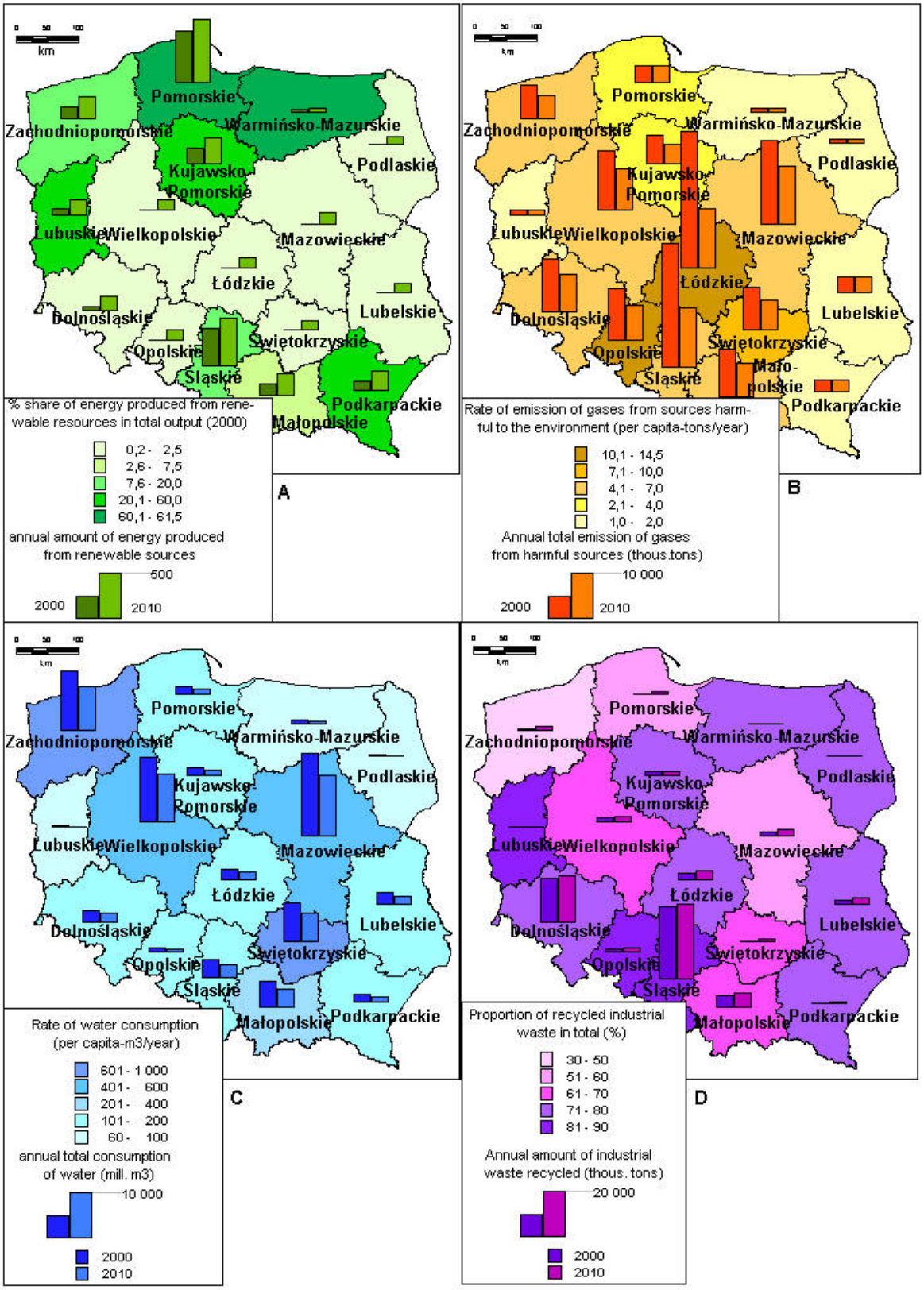


Figure 7: **Desired absolute values for 2010 for indicators of SD. shown against those for 2000**
A. Increase in the amount of energy derived from renewable sources.
B. Reduction in the amount of gases released into the atmosphere from harmful resources.
C. Decrease in water consumption.
D. Increase in the utilisation of recycled industrial waste.

An analysis of the values of 15 indicators of changes desired in the first decade of the twenty-first century enabled seven types of regional environmental policy to be defined (Table 2). The most concerted efforts in this area should be made by the voivods of central Poland, *Lodzkie*, *Mazowieckie* and *Wielkopolskie*, and only slightly less intense efforts are called for in *Slaskie* and *Malopolskie*. The least pressing action is needed in *Lubuskie*, *Podkarpackie* and *Warminsko-Mazurskie*. Relatively mild policies should also be pursued in *Podlaskie* and *Pomorskie*. In the remaining regions policies should be implemented at a medium level of intensity.

Voivod	Infrastructural measures aimed at prevention of degradation			Infrastructural measures aimed at liquidation of degradation			"Soft" measures" – conservation/ environmental management			Type of policy
	broad	medium	narrow	broad	medium	narrow	broad	medium	narrow	
Dolnośląskie										V
Kujawsko-Pomorskie										IV
Lubelskie										IV
Lubuskie										I
Łódzkie										VII
Małopolskie										VI
Mazowieckie										VII
Opolskie										III
Podkarpackie										I
Podlaskie										II
Pomorskie										II
Śląskie										VI
Świętokrzyskie										III
Warmińsko-Mazurskie										I
Wielkopolskie										VII
Zachodniopomorskie										V

Table 2: **Proposal for regional policy types in relation to environmental protection and sustainable development in Poland**

4. The stipulations of the voivod development strategies in the context of desired ecological policies.

The developmental strategies of the voivods**,** adopted by the regional councils for the first time in 2000-2001, were drawn up on the basis of sharply differentiated assumptions and methodologies. They are therefore not easy to compare. In the research, only part of which is presented in this article, the strategies were evaluated by applying various criteria to analyse both their diagnostic components(mainly the SWOT analysis) and their operational components (tasks and projects), with respect to their implementation of the range of issues contained in them relating to environmental protection and sustainable development. In this summary of the research the focus is on the characteristics of the operational side of the strategies. Most of the stipulations of the

strategies are ranked in four (occasionally three) categories, the first being a single-sentence expression of the vision, mission or priorities set up in the regional strategy. At the next level of the strategy are the stipulations which cover the issues analysed and which vary greatly in number from a mere handful to a total of over a hundred. Much the greatest involvement in environmental and ecologically sustainable development action is shown by *Wielkopolskie*, *Zachodniopomorskie*, *Warminsko-Mazurskie* and *Kujawsko-Pomorske*. Next in order come *Podlaskie*, *Dolnoslaskie*, *Slaskie*, *Lodzkie* and *Pomorskie*. The fewest stipulations dealing with these matters are found in the strategies of *Opolskie*, *Lubelskie*, *Lubuskie* and *Podkarpackie* (Fig. 8). In terms of action directed at environmental and sustainable development, the lead is taken, when taking the stipulations of their strategies as a whole, by the regions of *Wielkopolskie*, *Kujawsko-Pomorskie* and *Warminsko – Mazurskie* (>25% of the total number of stipulations) and *Dolnoslaskie* and *Lodzkie* come out worst (5-10%).

A quantitative analysis of the terms of the strategies is, however, only the prelude to the research, the goal of which is to establish the extent to which these conform to the anticipated values of indicators in particular spheres of desired action. Only an analysis of the range of measures to be undertaken, looked at in the context of the models of sustainable development and environmental protection presented earlier, may provide a partial answer to the question as to whether regional strategies in Poland are conducive to sustainable development. The next stage of this analysis was to determine the number of measures that are essential from the point of view of sustainable development and which were omitted in the strategies as well as measures which were included in the strategies but which, from the point of view of sustainable development, are redundant. (Fig. 9.). This analysis revealed the greatest deficiencies in measures relating to environmental protection and sustainable development in the strategies for the voivods of *Lodzkie*, *Lubelskie*, *Mazowieckie*, *Podkarpackie* and *Swietokrzyskie*. The voivods whose strategies showed the fewest omissions of measures indispensable or advisable for implementation were *Slaskie*, *Malopolskie* and *Podlaskie*.

A slightly lesser issue than the omission of desirable measures is the inclusion of measures which appear redundant in terms of regional needs. This is not to say that they should not be implemented locally in some parts of the voivods. However, on the regional scale these measures are not significant. The voivod of *Warminsko-Mazurskie* showed the highest number of these "redundant" measures, a total of 13 being found here, while *Pomorskie* (8), *Lubelskie*, *Podkarpackie* and *Wielkopolskie* (6 each) also had a fairly high number of such measures.

In general, when assessing the completeness of the strategic measures in the sustainable development and environmental sphere in the context of the terms of the model in its rational variant and the regional environmental policies identified, the strategies of the following voivods emerge most strongly: *Kujawskie-Pomorskie*, *Lubuskie*, *Malopolskie* and *Slaskie*, while the weakest were *Lodzkie* and *Lubelskie*, *Podkarpackie*, *Warminsko-Mazurskie* and *Wielkopolskie*. The remaining strategies are, with certain reservations, correct.

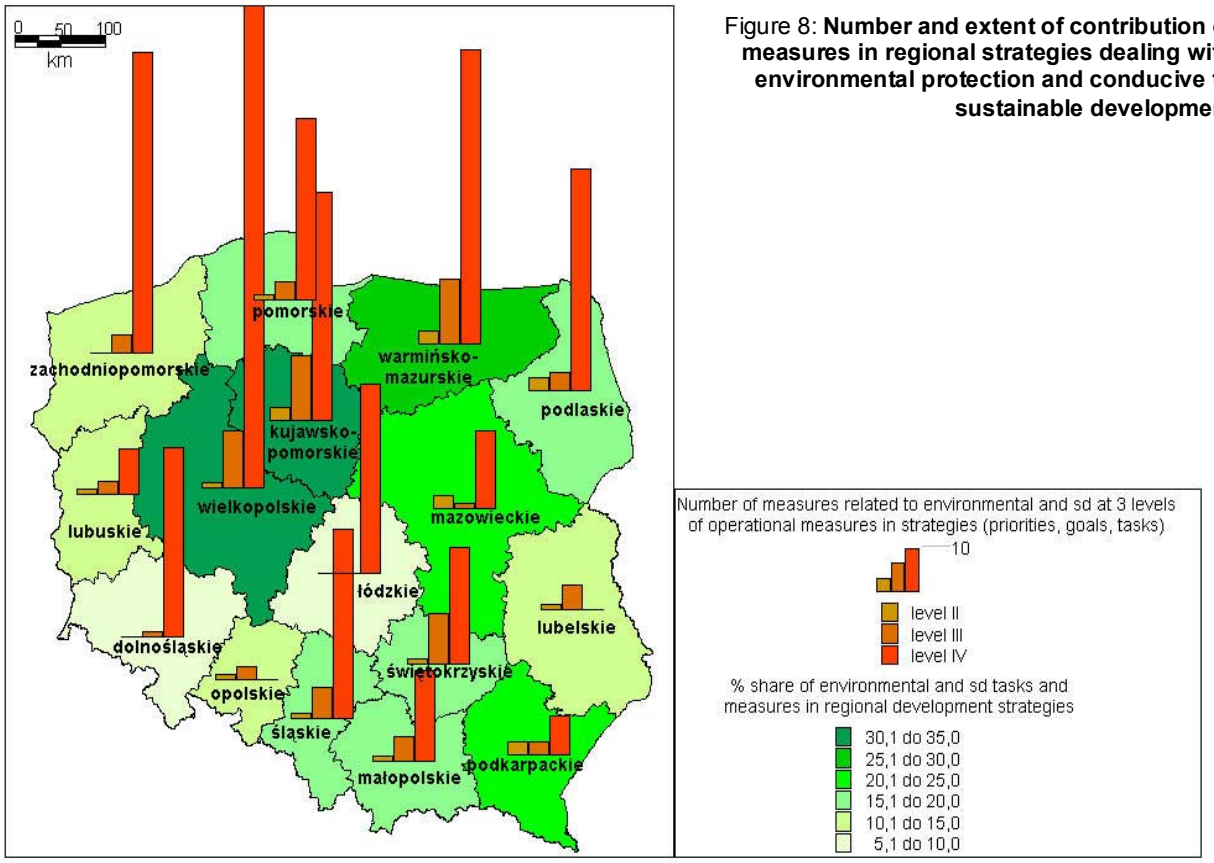


Figure 8: **Number and extent of contribution of measures in regional strategies dealing with environmental protection and conducive to sustainable development**

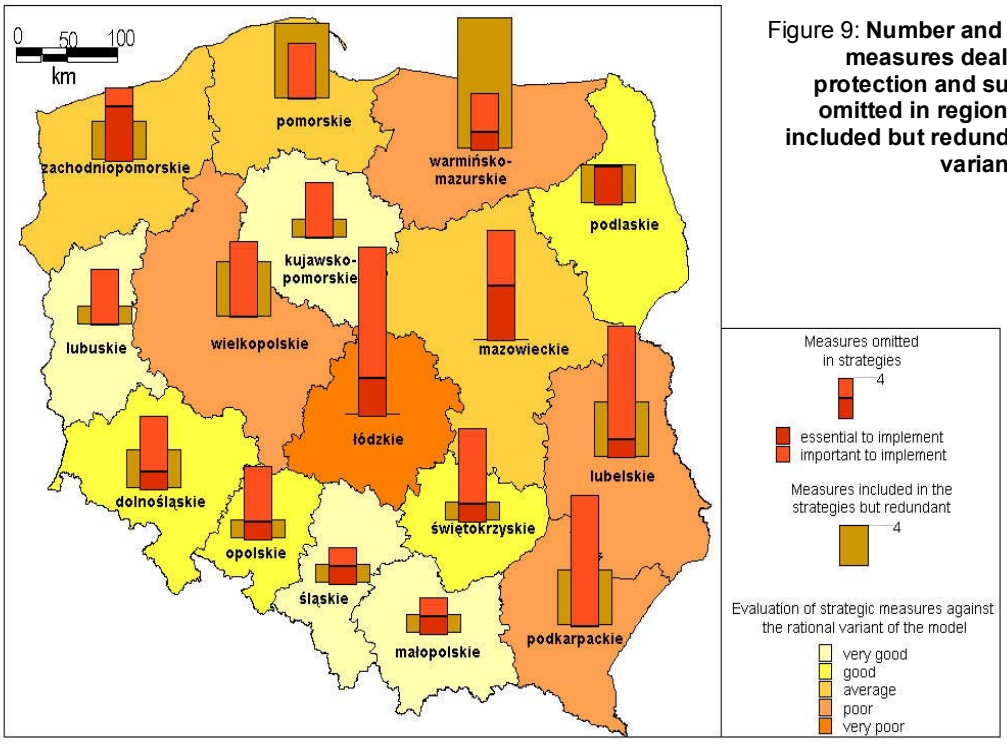


Figure 9: **Number and synthetic evaluation of measures dealing with environmental protection and sustainable development omitted in regional strategies and those included but redundant in terms of rational variant of the model for RSD.**

Conclusions

In attempting to answer the question as to whether regional strategies in Poland are conducive to sustainable development in the context of the considerations that have been put forward, it has to be stated that the majority of voivod development strategies do not ensure satisfactory level of environmental protection or progress in sustainable development. When taking into consideration all the criteria employed in the evaluation of the strategies i.e.:

- The quantitative assessment of the diagnostic parts of the strategies (SWOT analysis)
- The quantitative assessment of the operational parts of the strategies (measures)
- The assessment of both these parts in the context of environmental and sustainable development indicator values
- The assessment of the strategic measures against a model in its rational variant,

it can be seen that eleven strategies call for considerable supplementation and improvement (Fig. 10).

From the point of view of the research, the strategy of the *Lodzkie* voivod comes out worst and in principle it may be recognised that it should be reworked from scratch so as to get to grips better with its environmental and ecodevelopmental aspects. The strategies of *Lubelskie*, *Mazowieckie* and *Podkarpackie* also call for considerable amendment and extensive supplementation. This is true to a somewhat lesser extent of the strategies of *Dolnoslaskie*, *Lubuskie*, *Opolskie*, *Swietokrzyskie*, *Warminsko-Mazurskie*, *Wielkopolskie* and *Zachodniopomorskie*, although these also require significant amendment and supplementation. The proposed amendments and supplements concern various parts of the strategies of, for example, *Dolnoslaskie* and *Warminsko-Mazurskie*, while in *Malopolskie*, *Podlaskie and Pomorskie* they primarily concern the diagnostic part of the strategy and in *Lubelskie*, *Podkarpackie* and *Mazowieckie* they touch on the part directed to operational measures.

Among the strategies which best fulfil the functions analysed in the research, that of *Kujawsko-Pomorskie* should be mentioned above all, followed by that of *Slaskie*. Obviously, this does not mean that they could not benefit from certain amendments and additions.

In the course of the investigations that have been carried out, the need has become apparent for considerable modifications to the procedures and methodology for drawing up voivod strategies for development (particularly in the diagnostic parts). There is also a need to:

- broaden the information base serving research which addresses sustainable development
- improve methodologies for modelling the processes of environmental protection and sustainable development and their inclusion into strategic planning at regional level.

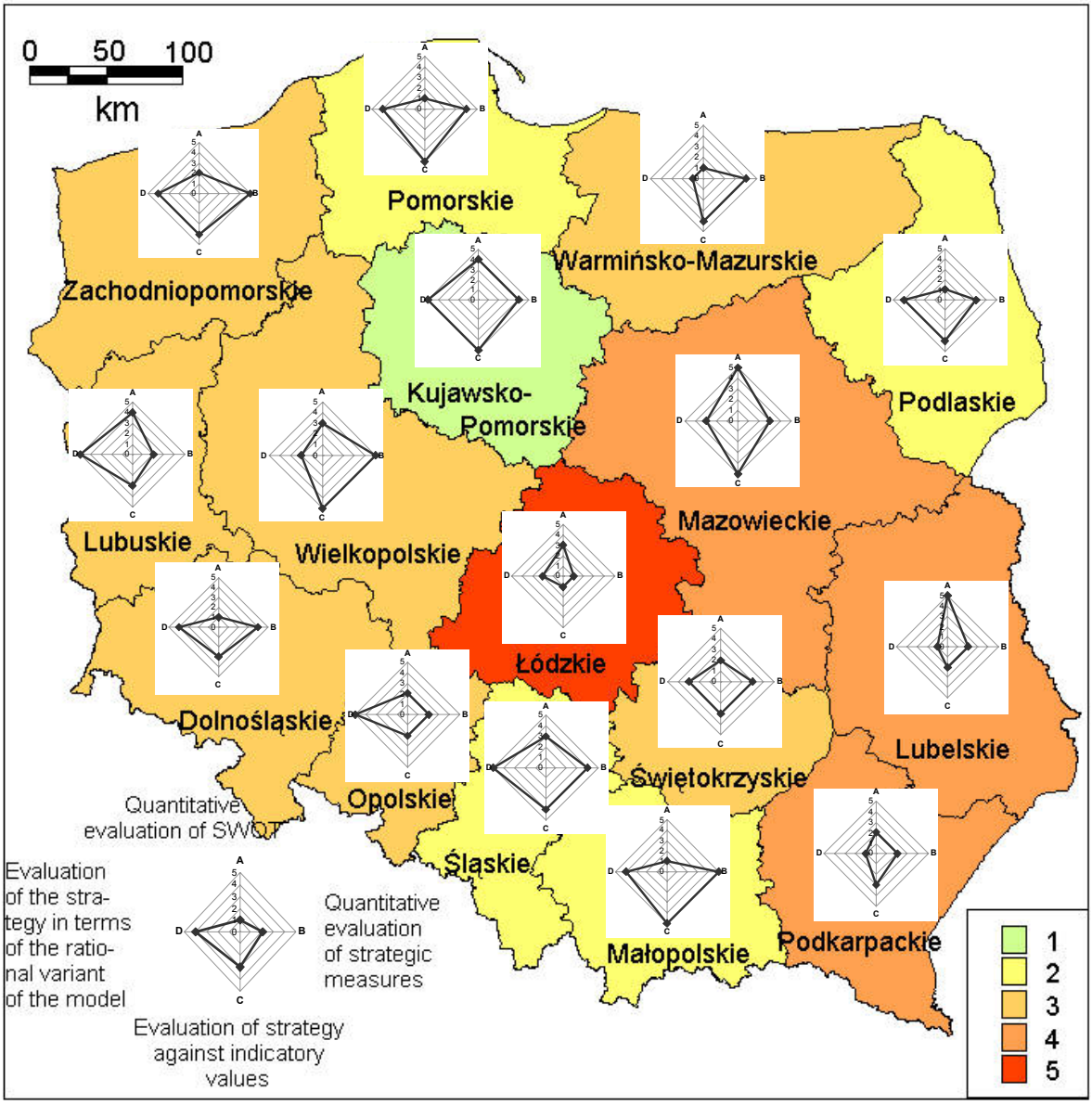


Figure 10: **Spatial schedule of synthetic evaluations of rsd in regional strategies and recommendations concerning their necessary validation**

Recommendations for validation (with reference to colours in Fig. 10) :

1. Strategies have a good foundation for rsd and require only slight supplementations
2. Strategies have a good foundation for rsd and require some supplementations
3. Strategies do not have satisfactory foundation for rsd and require considerable supplementations
4. Strategies have a weak foundation for rsd and require extensive supplementations
5. Strategies with poor foundation for rsd which need to be reworked to include eco-development aspects

Final comments:

1. The methodology presented here developed for measuring the level of RSD. and environmental protection adopted in regional strategies in Poland can be used for other evaluations.
2. After certain amendments the methodology may serve for the evaluation of results in the projects financed by EU structural funds with respect to their supporting SD.
3. The methodology may also be applied in setting Euro regional standards of sustainable development and using these to allocate financing properly to regions below these standards.
4. The methodology should be developed further in order to include also more economic indicators and processes as well as indicators of social progress and improvements. The focus in the methodology is on environmental protection issues.
5. The entire methodology is much wider and brings more detailed comparisons and results. The presentation had to be limited to the size recommended. There is, however, a readiness to internationalize this methodology in the event of interest on the part of the Regionet partners or the DG Regio.

Elżbieta Gończ
Gdańsk Higher School of Humanities, Management Department
Contact Address: Str. Wrocławska 129, 81-530 Gdynia, POLAND; egoncz@gnu.univ.gda.pl
Phone: (+48 58) 664-86-42; 664-66-91; Telefax: 664-67-08; mobile (+48 501) 052-527

Mariusz Kistowski
University of Gdańsk, Chair of Physical Geography & Environmental Management
Contact Address: Str. Dmowskiego 16 A, Gdańsk, POLAND; geomk@univ.gda.pl
Phone: (+48 58) 341-00-61