

From assessment to policy and back to assessment and research: the Flemish case

M. Swerts, L. Vandekerckhove, H. Neven and M. De Vrieze

Ministry of Flanders, Land Division, Wetstraat 34-36, 1040 Brussel, Belgium, e-mail: martine.swerts@lin.vlaanderen.be; liesbeth.vandekerckhove@lin.vlaanderen.be; hendrik.neven@lin.vlaanderen.be; marnix.devrieze@lin.vlaanderen.be

Introduction

In Belgium, environmental matters are a competence of the regional authorities (Flanders, Wallonia, and Brussels). In Flanders, the step was taken to move on from assessment of erosion, as a mere scientific activity, to the development of a policy to prevent and combat erosion. This policy is embedded in the Flemish soil protection policy, which will be attuned to the European soil protection policy in preparation.

In this paper we describe the data used as a base to develop and implement an erosion policy. Next the Flemish policy to prevent and combat erosion will be discussed, followed by a brief explanation on the Flemish and European soil protection policy. Finally, some ideas are brought in on how scientists can further support the development of the erosion policy.

Available data

After years of assessment by different research institutes in Belgium, a lot of data on erosion were available. However the ranges in time and scale differed widely and data were not always readily accessible. Data covering the whole territory are useful to define the areas to which most attention should be paid. The more local data and descriptions of particular events could rather be used as illustrative material. Data under Flemish conditions on how to combat erosion and on the effectiveness of erosion control measures were hardly available. In the following paragraphs a brief description is given of the main data used, to develop a Flemish policy to prevent and combat soil erosion in high risk areas. Full details can be found in literature.

Data covering the whole territory

Results of a modelling exercise

A basic tool used in the preparation and the implementation of the Flemish policy to prevent and combat erosion is a soil erosion map, covering all of Flanders, which was the result of a modelling exercise by Van Rompaey et al. (2000), using the Revised Universal Soil Loss Equation-methodology (RUSLE, Renard et al., 1991, 1997), adapted to a two-dimensional landscape by replacing the upslope length by the unit contributing area. Mean annual soil erosion values (t/ha.year) were calculated for pixels of 20 m x 20 m, which can be aggregated at the field parcel level or at the municipality level. Both soil erosion by water and by tillage are considered. A full

explanation of the model used, the level of model-input, the aggregation and the geographical presentation can be found in Vandekerckhove et al. (2003). Field experience confirms that the theoretical erosion values at the field parcel level are fairly realistic. However, no systematic validation at the field parcel level has been carried out.

Data derived from the Belgian soil map

In addition to the soil erosion map, a map indicating the long-term effect of soil erosion on soil fertility and on soil erodibility (Librecht and Van Orshoven, 2003) is used for erosion policy purposes. The idea behind the map is that both soil fertility and soil erodibility may change with advancing erosion. Soil horizons below the surface layer may, when they become the topsoil, have a different fertility or erodibility compared to the present topsoil. Moreover, the effects will show up sooner if the horizon with differing properties is situated closer to the present soil surface. The map was directly derived from textural and morphological soil properties as indicated by the Belgian Soil Map (scale 1:20.000). The Belgian Soil Map contains relatively detailed information on textural variations, both horizontal and vertical, on drainage class, and on soil profile development. The presence of a substrate layer within the soil profile is indicated, together with the depth at which the substrate was found. More details on how this map was derived from the Belgian Soil Map and on the concept of this map combining three different sub-indicators can be found in Vandekerckhove et al. (2003).

The soil erosion map, the result of a modelling exercise, taking into account soil type, topography, current land-use etc., provides a clear overview of the spatial distribution of present-day erosion problems. The map indicating the effect of soil erosion on soil fertility and on soil erodibility in the long run, adds the long-term dimension to the tools used for the preparation and implementation of the Flemish policy to prevent and combat erosion, thus introducing certain aspects of sustainable development.

Local and incomplete data

Next to the data described above, which were available in an identical way for the whole territory, a huge amount of data exists describing e.g. the consequences of specific rain events at certain locations, or the monitoring results of a certain location or small watershed for several years. From local, intermediate and Flemish administrations data are available on the amount of sediment which has to be removed from streams and water-bodies and sometimes of the financial implications. However these data are incomplete and often obtained with different methods. For certain major events reports are available describing damage to private properties, agriculture and infrastructure. Different inventories exist where local authorities were questioned on whether or not they had erosion problems or problems with muddy floods, and where the eventual problems were located. However, response to such questionnaires is variable, and might result in a biased picture. Some local authorities have very good information on the magnitude, location and cost of the erosion problems in the area they are responsible for. However, the quality and the amount of information available from local authorities differs tremendously.

The policy response

The data described above were sufficient to start up a Flemish policy to prevent and combat erosion. From a scientific point of view or for reasons of principle, one could argue that more, or more detailed, data had to be available, e.g. a survey of long term actual soil loss through erosion covering all of the territory. However, such an exercise would be very costly and time consuming. Taking into account the precautionary principle, the data described above provide sufficient information to justify the immediate start of a policy to prevent and combat erosion.

The policy prepared by the Flemish administration was adopted by the Flemish government. However one cannot be sure to what extent this was due to the underpinning scientific data, or to the influence of press, citizens and local authorities in areas with frequent muddy floods and high erosion risks.

Although the Flemish erosion policy developed at a certain stage very rapidly, it remains an integral part of the Flemish soil protection policy, which, in its turn, interacts with the emerging European soil protection policy. In the following paragraphs the current state of development of the Flemish erosion policy, the Flemish soil protection policy and the European soil protection policy will be discussed briefly.

The Flemish erosion policy

The Flemish policy to prevent and combat erosion is oriented towards two target groups : the local authorities and the farmers. The present policy is a policy of encouragement. Financial stimuli were worked out and communication and collaboration were started up. At present, all interventions are on a voluntary base. There are no obligations.

We are convinced that action should be taken as source oriented as possible, in other words : on every field in erosion risk areas. However, it will never be possible to convince all farmers. In the short run, fields under conservation agriculture will remain a rare minority. Even if, in the long run, a majority of farmers would apply one or another conservation measure on their fields, this would not be enough to prevent damage in case of an extremely heavy rain event. Therefore, small scale erosion combating works, such as small dams, retention ponds, grassed waterways and grass buffer strips are stimulated as well. As such, we try to obtain a realistic mix between theoretically optimal and practically feasible solutions.

Towards farmers

Farmers can take the most source oriented erosion prevention measures on their fields. Through communication, farmers are made aware of the on-site and off-site effects of erosion and they are advised on how to avoid problems. Demonstration projects are being set-up, amongst others in cross-border projects, where the Flemish administration collaborates with farmers organisations and intermediate authorities (provinces), with the financial aid of the European INTERREG-programme. Other extension initiatives arise from a covenant between the Flemish Region, and the local and the intermediate authorities, from LIFE-projects, and even from universities.

Farmers can be subsidised to apply measures to prevent or combat erosion when these measures go beyond good agricultural practice. The subsidies fit in the Flemish Plan for Rural Development in the framework of the European regulation 1257/99. At present, individual farmers can be subsidised for sowing cover crops, for afforestation of agricultural land and for providing grass buffer strips along rivers and sunken lanes. These are all measures with a broader environmental impact than just erosion. Further more the European regulations for set-aside can be beneficial for erosion prevention. In the near future additional subsidies will become available focussing on erosion. These "erosion prevention subsidies" include grass buffer strips at any field border or in the field, grassed waterways, small dams with retention pond, conservation tillage, no-till, and preservation of grassland on strategic locations. This new package of subsidies in the framework of the Flemish Plan for Rural Development was advised positively by the European STAR committee on June 25th 2003. Implementation is foreseen for 2004.

Towards local authorities

Local authorities are best placed to carry out small scale, source oriented measures to prevent or combat erosion. They know the local problems and conditions best, they have good contact with the farmers and the citizens involved and they are well placed for later maintenance. The Flemish administration provides the local authorities with the necessary back-ground information and supports them when developing an erosion project.

Since December 2001, local authorities can receive a subsidy to draw up a municipal soil erosion action plan, and/or to carry out small scale soil erosion prevention or combating works. A municipal action plan is drawn up according to a code of good practice. This plan identifies both actual and potential problem areas, and proposes scenarios to solve the problems. Small scale erosion prevention and combating works should be designed to control runoff to less erosive rates and/or to temporary retain runoff on the field parcels, as close to its source area as possible. The subsidy amounts 75% of the total costs, including compensations for the landlords and for the farmers. Until recently local authorities and many of their project designers tended to think in terms of concrete constructions, retention ponds and accelerated water discharge. However, since the introduction of the possibility for local authorities to receive subsidies to carry out small scale erosion prevention or combating works, many erosion projects have been initiated combining several source oriented measures such as grass buffer strips, grassed waterways, hedges, small dams (constructed with straw or with soil or a combination of soil and stones), natural buffer zones, and small scale retention ponds.

The Flemish soil protection policy

The Flemish soil protection policy aims to protect the soil against degradation, to maintain or improve its suitability for as many functions as possible. Soil is considered as a non-renewable resource. Erosion, contamination, loss of organic matter, soil sealing, acidification, compaction and loss of soil fertility are recognised as the major threats to Flemish soils. A Flemish Parliament Act on soil protection was prepared by the administration and is at present under political

discussion. This act will provide the opportunity to lay down source and result oriented standards, to introduce protection measures and to demarcate soil protection zones. Next to the legal instruments, financial instruments and communication and demonstration are part of the strategy to reach a better protection of soils.

The European soil protection policy

The 6th Environmental Action Plan of the European Community includes the development of a thematic strategy on soil protection. As a first step the European commission presented in April 2002 the "Soil Communication". As major soil threats, erosion, decline of organic matter, soil contamination, soil sealing, compaction, decline of soil biodiversity and salinisation were put forward. In the conclusions of the European council of June 25th 2002, the decision was laid down that the European commission has to present following documents by 2004 : a thematic strategy on soil protection, a proposal for a soil monitoring directive, and a communication on erosion, decline of organic matter and contamination. The second step in the development of a EU soil policy, i.e. the preparation of the documents described above, is ongoing, with involvement of the member states, the future member states and the stakeholders (including research organisations). Five working groups were installed : erosion, organic matter, contamination, research, and monitoring. An advisory forum is established to guide the soil policy development process, by coordinating and overseeing the work of the different working groups, and by giving guidance on key issues. At present, a lot of work is being done, under high time pressure. A third step in the development of an EU soil policy will start in 2005 and will include the future developments, largely depending on the outcome of the present work.

Policy evaluation and research needs

After policy development, the logical next step in the policy cycle, is policy evaluation, to be followed by policy adjustment. In the case of the Flemish erosion policy, not only the policy as such has to be evaluated. There is still a lot of research to be done to evaluate and improve the different erosion control measures. So, this is the point where the circle is closed and the administration will come back to the scientists for assessment and research.

As described above, the local authorities are subsidised to draw up a municipal soil erosion action plan. In these plans, problem areas are defined in a uniform way. Problem areas include problems with housing and infrastructure, high sediment input to watercourses and fast decline of soil fertility due to erosion. It is expected that most actual and potential problem areas in Flanders will be inventoried within the next four years. The proportion of problem areas where effective actions have been undertaken, is a practical indicator that will be used to evaluate the Flemish soil erosion policy. Data will be easily accessible as the Flemish administration has to approve the municipal soil erosion action plans, and has to award "erosion subsidies" to local authorities and farmers. Next to this very practical indicator, the Flemish erosion policy can be evaluated in a more scientific way. For example, reductions in sediment delivery to watercourses, should become clear from the sediment monitoring network of the Flemish authorities as described by

Van Hoestenberghé and Eylembosch (2003). Other evaluation techniques will have to be developed.

The Flemish erosion policy developed very rapidly the past three years. At the time, not all necessary knowledge was available. For example, information on effectivity and efficiency of most erosion control measures under Flemish conditions was scarce. Inspiration came from common sense, knowledge out of local initiatives, and information from literature and from neighbouring countries. The positive point about this fast development is, that in a time span of a few years there will be a lot of measures taken at different locations, under field circumstances. This will enable us to evaluate these measures, both from a practical and from a theoretical point of view. These evaluations will allow us to fine-tune and improve our advice to farmers and local authorities. The amount of practical information and data on performance and acceptance of different techniques which will be gathered through co-operation with farmers and local authorities, will far exceed the amount which could have been reached using research funds. Interpretation of the data will have to be done by scientists. The efficiency and effectivity of the different measures will have to be evaluated, and where possible improved. Interdisciplinary co-operation and contact with farmers will be very important. To solve the problems, interaction is necessary between at least geomorphologists, soil scientists and agricultural experts.

References

- Librecht, I., and J. Van Orshoven. 2003. Aandachtszones voor erosiebestrijding: de bodemkundige erosiegevoeligheidskaart. Report to the Land Division of the Ministry of Flanders. (in Dutch).
- Renard, K.G., G.R. Foster, G.A. Weesies and J.P. Porter. 1991. RUSLE Revised Universal Soil Loss Equation. *J. of Soil and Water Conservation* 46:30-33.
- Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool and D.C. Yoder. 1997. Predicting soil erosion by water: a guide to conservation planning with the Revised Universal Soil Loss Equation (RUSLE). USDA Agricultural Handbook 703.
- Vandekerckhove, L., M. Swerts, G. Verstraeten, H. Neven and M. De Vrieze. 2003. Four indicators of soil erosion as used by policy makers in Flanders (in press). *In* Parris, K., and R. Francaviglia (ed.) Proceedings of the OECD Expert Meeting on Soil Erosion and Soil Biodiversity Indicators, March 25-28, 2003, Rome.
- Van Hoestenberghé, T., and J. Eylembosch. 2003. Sediment measurements in non-navigable watercourses : a monitoring network in Flanders. *In* D. Gabriels and W.M. Cornelis (ed.). 25 years of assessment of erosion, Proceedings of the International Symposium, September 22-26, 2003, Ghent.
- Van Rompaey, A.J.J., G. Govers, K. Van Oost, W. Van Muysen and J. Poesen. 2000. Boderosiesnelheden op landbouwpercelen in Vlaanderen. Report to the Land Division of the Ministry of Flanders. (in Dutch).