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Publication Date
2003-08-24
Targets and Measures for Consideration of Natural and Cultural Heritage Assets in the Transport System

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Abstract: Integration of environmental issues in sectorial work has long been regarded as essential in order that environmental problems may be solved and new problems may be avoided, i.e., in order that the development of a sustainable society may be possible. It has still been very difficult for environmental issues to hold their own among other interests, not least of which is the infrastructure sector. Areas which could be described in terms of numbers, preferably in monetary terms, have done better than others. It is, however, possible to integrate natural and cultural heritage assets in infrastructure planning without the need for monetary values. This demands a systematic way of dealing with natural and cultural heritage assets which comprises, at the same time, both the national level and the whole chain of measures down to individual infrastructure projects, such as new construction, management and maintenance.

The key factor is target control at all levels. The Swedish National Road Administration, in cooperation with other transport authorities, has developed a systematic method of dealing with natural and cultural heritage assets, entitled targets and measures for consideration of natural and cultural heritage assets in the transport systems. Tests of the method have been performed in actual road management projects. The method has been applied in both maintenance districts and road investment projects. The test projects have passed through one or more planning stages, but as yet there is no completed road project in which the method has been applied throughout, i.e. from preliminary study to a completed road. An analysis of the application of the method in road management processes has been performed by the Department of Landscape Planning, Ultuna, of the Swedish University of Agricultural Sciences (SLU). The aim of the analysis was to answer questions relating to both the conditions for successful implementation and satisfactory results of the method, and the processes which may be thought to influence effective implementation. The analysis has been carried out through interviews and through studies of the documents and results. The results of the test projects clearly suggest that the method enhances clarity and awareness of natural and cultural heritage assets, that it breaks with the culture of negotiations among interests during the planning process in favour of a holistic approach and a more open-ended and result-oriented discussion, and that the method encourages interaction with other players by virtue of the targets which are expressed in tangible terms and are based on common concepts. The results also demonstrate that it is easier to strike a balance between target areas, and that the method makes for a better decision base. On the whole, the players involved in the test projects are very much in favour of the method. To sum up, results so far are very positive, and the method shows great potential for integrating qualitative values such as natural and cultural heritage assets in road management processes. The test projects also highlight the need for further development in some areas of the method. What is without a doubt most important is to develop knowledge of, and support for, work with project targets and their formulation. There are a great need for support and aids for the production and formulation of descriptions for natural and cultural heritage assets as the basis in formulating project targets and in analysing the impacts of the proposed measures in relation to the project targets in the EIA. Furthermore, the interface between a target-controlled planning process and the EIA is perceived as lacking in clarity and hard to understand.

The test projects also show quite plainly that many problems, which are not directly coupled to the method and cannot be solved by modifying this, remain to be solved. Examples of such problems are the expertise and ability of the users and shortcomings in institutional support. The method provides good opportunities for greater participation by the public and non-profitmaking organisations. However, there is a great risk that these good opportunities will not be realised and the process will continue to be dominated by experts, unless methods and aids are developed so that the opportunities provided can be put to good use. The new approach that the method demands from nature conservancy and cultural heritage preservation agencies has not been fully accepted.

Natural and Cultural Heritage Assets in Infrastructure Planning

Integration of environmental issues in sectorial work has long been regarded as essential in order that environmental problems may be solved and new problems may be avoided, i.e., in order that the development of a sustainable society may be possible. This was accorded priority at the UN Conference on Environment and Development in Rio de Janeiro in 1992. Sectorial integration implies that the players in a sector shall consider the environment on the same terms as other interests, e.g., economic and social issues. Unfortunately, this is easier said than done. It has still been very difficult for environmental issues to hold their own among other interests, not least of which is the infrastructure sector. Areas which could in one way or another be described in terms of numbers, preferably in monetary terms, have done better than others, which is confirmation of the fact that what can be measured will be done. Integration of the areas which cannot be described in terms of numbers, such as natural and cultural assets, has been very slow. But can it really be so simple that it is merely a matter of numbers?
When the treatment of natural and cultural heritage assets in infrastructure planning is examined, it is possible to make an observation that is a little surprising. Why are these assets almost without exception regarded as a problem in planning, and, therefore, as something that must be dealt with in a negative way? After all, they are qualities which most people normally value greatly in their everyday lives. Everybody would miss birdsongs if suddenly spring no longer followed winter. Who does not feel a thrill on seeing a deer moving across the field in the morning mist? Who does not feel glad that the fox managed to get across the road although it seemed condemned to be hit by the car? Can infrastructure planners and road engineers be an exception to this? Hardly.

When infrastructure planning is analysed in greater detail, other reasons soon surface. The way usual or "normal" road planning, if it is at all possible to generalise, is carried out is that "someone" calls attention to a perceived "problem," usually by proposing a solution. This may be a private person, a municipal councillor or somebody else who considers that there is too much traffic on a road, that a road is "bad," that it is impossible to overtake over a certain section, etc. While discussions are held on the need for a new road, this somebody suddenly becomes many people. After a time, the problem and also its solution are defined: a new road is needed. When it is time to carry out a preliminary study, many people already have an idea as to what must be done. The task is to plan a road. It is seldom that the problem is analysed in greater depth, after all the problem has already been defined. Planning proceeds and is broadened, and in due course it results in a few alternative routes for the new road.

It is only now, when the project manager and others who are involved have already a fairly clear idea of the final result and consider that the solution is ready to be submitted to their client, that the question arises: What will be the environmental impact of this?

It is then almost natural for considerations which now arise to be regarded as a problem, an obstacle to a road that has already been set out. Even though the questions concern assets that everybody normally considers to be of great importance.

_Natural and cultural heritage assets, together with other environmental assets, are quite simply considered too late in the process, both conceptually on the part of those who have to deal with the problem and as regards to planning methodology._

The next problem now comes to the fore. How do you consider the negative impact on the environment in relation to the gains that have long been taken into account and which have often motivated the investment? This is often expressed in terms of the imprecise concept “macroeconomic cost effectiveness.” What is natural is that any “assets” (or rather, in this conceptual world, costs) must be described in terms that can be understood at this stage and can be balanced against one another. What is natural and easiest is to demand that they must be expressed in terms of economic gain!

The problem is that these qualitative values cannot be described in economic terms. There are as yet no effective methods. It is doubtful whether this is at all possible. There are no markets that allocate a fair monetary value to woodpeckers, beavers or roaches. Methods such as a willingness to pay have not succeeded in arriving at fair valuations or estimations. In addition, it is seldom that there are any scientifically objective “right or wrong” consequences in nature, merely different results.

One example: Fragmentation means breaking up the landscape into progressively smaller contiguous areas, something that infrastructure, among others, has contributed to. Fragmentation may take the form of putting a deciduous forest into cultivation. The forest is gradually cut down and is changed, via grazing and haymaking, into arable land. Soon, all that remains is small "islands" of forest in the form of wooded hills, shelterbelts along watercourses, etc. The original plants and animals have been replaced by others adapted to an open landscape. Whether this is positive or negative cannot be answered easily, our perception often depends on what this situation looks like in a larger context. If it is the only deciduous forest in an otherwise open landscape, perhaps it is not positive, while it may be so if the landscape otherwise consists only of deciduous forest.

There is yet another danger for assets that cannot be described in monetary terms. If the assets are nevertheless expressed in terms of money, they can quite simply be entered into the calculations and an answer is arrived at. Macroeconomically cost effective or not? Right or wrong to build a road? But what actually are the consequences of the decision? These need never be expressed. Or discussed. This is very tempting for decision makers. Look at this – we have an (apparently) objective answer: this is macroeconomically cost effective. A fact that is often the result of ill-defined decisions without justifications or explanations.
This belief or naïve hope that there is always an objectively right answer to a question has the result that even issues regarding fundamental values have to be answered by researchers. However, science can only confirm or reject hypotheses, i.e., provide background data for democratic decisions, e.g., for a decision as to which assets are to be retained/developed, or not, in conjunction with a certain infrastructure measure. In such decisions, science must naturally make a contribution, but what is equally important is that those affected should have the same opportunity in some kind of a democratic process. In today's planning processes, there is no provision for such dialogues regarding fundamental values.

No values are put on natural and cultural heritage values, and there is no support for a methodical valuation in the existing planning process. There is no provision or practice for fundamental dialogues concerning values in the planning process.

It is seldom that decisions, the consequences of decisions and the reasons for decisions in the planning process are set out in each case in a way that can be understood by a layman.

But, surely, the consequences are set out in the environmental impact assessment (EIA)? One may think so, but in most cases it is descriptions and, in the best case, effects that are set out, and seldom the consequences. But the problems remain. Environmental issues are considered too late and are not valued on the same terms as other interests. A “planning culture” which in itself poses a problem for qualitative and non-monetary values has in practice developed in conjunction with the planning and EIA processes. Fundamentally, the planning process and the EIA are distinct processes overseen by different agencies. The planning process is the responsibility of the transport authorities. EIA is approved by the county executive board which has no economic responsibility for the results of the planning process, but often has regional policy interests in the final result. Owing to the fact that the agency that must carry out the planning process/the agency that must consider the problem does not have, or consider that it has, the responsibility for environmental issues including natural and cultural heritage assets, the agency that has to consider the problem has no clear incentive to look actively for solutions that give equal consideration to all interests. It is more a matter of having the EIA approved, the commission given to a consultant may even have “EIA approved” stamped on it, so that the “actual” work on planning a new road may proceed as smoothly as possible. The EIA describes values, examines effects, in the best case sets out the best consequences and proposes measures, sometimes in a good way, but hardly ever specifies requirements and conditions regarding adaptations/measures for the natural and cultural heritage assets. What is described in the EIA and what is actually the result, need not be, and seldom is, the same thing.

There are no clear incentives for the agency that must consider the problem/the agency that must carry out the planning process to feel that it has the responsibility that the measures/solutions give equal consideration to environmental issues inclusive of natural and cultural heritage assets.

Within infrastructure planning, a culture has developed which means that if targets are set, they must be targets that can be achieved. It must be possible to report that everything has been achieved and all is well. Basically, it is conflict avoidance. Unfortunately, reality is not like this. All changes in the natural landscape, such as a new road/railway, have an impact on the natural and cultural environment. What is usual is that positive consequences for somebody means negative consequences for somebody else at the same time. This is why it is essential to set out what impacts the measures decided on will have. It is only in this way that it is possible to monitor developments in the natural and cultural landscape towards the desirable qualities that society, via national goals, has determined shall exist. Setting up targets which are judged possible to achieve implies a more or less “unintentional” economic value judgment as to which measures “can” be taken with reference to a project budget allocated at a very early stage. What this means in practice is that interests described in monetary terms, mainly accessibility, traffickability and traffic safety, are accorded greater importance than others.

Since targets in an investment project are specified so that the project will be able to achieve these, it is not possible, with reference to infrastructure projects, to evaluate and monitor the developments in the natural and cultural environment within the transport sector towards a desirable quality level, on either regional or national level.

Owing to the existing planning process, it is not possible with reference to planned and implemented investments to describe developments and monitor the situation for natural and cultural heritage assets which are affected by infrastructure, in the light of the overarching qualitative goals such as dynamic forests, wetlands thronging with birdlife, etc.
One factor which greatly contributes to the failure to fully integrate natural and cultural heritage assets in sectorial activity is the traditional conservation perspective of institutions and authorities which are in charge of the preservation of natural and cultural heritage assets, and the lack of in-depth dialogue between these institutions and other interests.

The starting point of the work of natural and cultural heritage preservation authorities is to "preserve" and "protect" the natural and cultural landscape from cultivation and development. This approach implies a static view of the landscape, and inevitably results in a passive detachment which only reacts to initiatives/leads by sectorial players. This approach is in collision with the user perspective of these players and thus with a dynamic view of the natural and cultural landscape. Because of this approach, the natural and cultural heritage preservation authorities will avoid cooperation rather than participate in development, discuss targets and ways of using the natural and cultural landscape while retaining/developing its desirable/necessary qualities. One clear and flagrant example of this failure is that, owing to constant protection requirements, the owners of forests are discouraged, rather than encouraged, from looking for species on the danger list in their forests that are scheduled for felling. The goal of forestry ought to be to manage forests so that desirable qualities are retained/developed in the forest, e.g., so that species on the danger list increase and remain in the forest.

The lack of dialogue and thus goals adapted to the work of the transport sector means that this work cannot be controlled or monitored with regard to these qualities, either on a national level or in conjunction with specific measures taken as part of this work.

This fundamental difference in approach is also one reason that there is no in-depth dialogue between natural scientists and engineers. To the contrary, mistrust and apprehension seem to have developed between these groups. A necessary dialogue and cooperation, which actively and in mutual trust develop specific targets and measures for the work of the sector, have, therefore, never been established.

No specific quality targets for the natural and cultural heritage assets have been formulated with reference to the work of the transport sector at the national level, nor quality targets and measures that can serve as support for prioritisation of individual measures, such as new construction and management, and for the identification of shortcomings in the existing infrastructure.

The prevailing approach within natural and cultural heritage preservation has also had the result that acquisition of knowledge and development of methods have focused on the location of assets and the development of methods for charting these, i.e., on locating and describing the assets. This is naturally good knowledge also for developers, but does not support the development of cultivation that retains/develops desirable natural and cultural heritage assets. The lack of knowledge and methods to answer questions of the type "is it possible to build a road here without damaging essential values" has the result that certain areas, "restricted sites," are instead avoided.

There is a lack of knowledge and methods which would make it possible to effectively integrate natural and cultural heritage assets in infrastructure planning. The methods available are not suited to the needs of developers, and knowledge is hard to get at, fragmented and insufficient for use in development planning.

To sum up, it may be said that natural and cultural heritage assets do not receive the same consideration in infrastructure planning as other interests that are described quantitatively. This is due to a number of interacting factors, primarily the absence of specific targets adapted to the transport sector, the lack of methods and aids for monitoring and control, shortcomings in planning methods and the prevailing planning culture, the absence of specific recommendations, rules and solutions for the adaptation of infrastructure and, not least, the prevailing preservation perspective of the natural and cultural heritage conservation institutions and authorities.

That is to say,

- Natural and cultural heritage assets are considered too late in the planning process.
- There is no balance struck between interests. A focus on the economy is the only method of valuation. Economy is accorded the status of a goal rather than a means.
- In practice, responsibility in infrastructure planning is divided, with the county executive board being responsible for environment and the transport sector for other fields of interest.
- The planning culture is characterised by conflict avoidance.
- There are no specific quality goals, either at the national level or for the work.
- There are no facilities for specific control and monitoring.
- Society places too much confidence in science, and there are no dialogues regarding values.
- Natural and cultural heritage preservation authorities have a static point of reference: protect and preserve.
There are also serious shortcomings that are not directly connected with infrastructure activity and its way of working and which demand long-term changes in priorities and strategies, in order to remedy:

- The lack of cost effective methods for landscape analysis and impact assessment, which can be applied in the early phases of planning.
- The very fragmented and inaccessible knowledge base which is generally inadequate and is mainly descriptive rather than evaluative. The knowledge base provides no support for answers to the questions that developers pose regarding the natural and cultural landscape.

Methods for the Integration of Natural and Cultural Heritage Assets in Infrastructure Planning

In light of the foregoing, it is obvious that much more than individual improvements or measures, such as monetary valuation, is needed in order that natural and cultural heritage assets may be successfully integrated in the existing planning and decision making processes.

It is, however, possible to integrate natural and cultural heritage assets in infrastructure planning without the need for monetary values. This demands a systematic way of dealing with natural and cultural heritage assets which comprises, at the same time, both the national level and the whole chain of measures down to individual infrastructure projects, such as new construction, management and maintenance. The key factor is target control at all levels.

In the light of the shortcomings that have been identified above, the following requirements can be formulated for a system that shall successfully integrate natural and cultural heritage assets in infrastructure planning:

- It functions all the way from national level to activity level.
- It lays down overarching aspirations at national level.
- It specifies qualitative and measurable targets for the natural and cultural heritage assets that affect the transport system.
- It makes it possible for a balance to be struck between target areas, both at national level and for each individual measure (investment projects, maintenance and management).
- It clearly places the responsibility for all areas of interest on the agency that must carry out the planning process.
- It guarantees equal treatment of natural and cultural heritage assets and other interests.
- It contributes to a good decision base and decisions that are fully cognisant of the impacts.
- It enables costs to be calculated.
- It is receptive to further development and improvement.
- It encourages greater dialogue, local influence and a holistic approach.

In order to meet these requirements, the Swedish National Road Administration, in cooperation with the other transport authorities, the National Environment Protection Agency, the Central Board of National Antiquities and the Swedish Board of Housing, Building and Planning, has developed a systematic method of dealing with natural and cultural heritage assets, entitled Targets and measures for consideration of natural and cultural heritage assets in the transport systems.

The background is that in 1998 the Swedish Riksdag resolved on new environmental goals for Sweden (Bill 1997/98:145). Goals for a sustainable transport system were also adopted the same year (Bill 1997/98: 56). The aspiration of the Riksdag is that Sweden shall have achieved the qualities expressed in these bills within one generation, i.e., by approximately the year 2030. The Riksdag also pronounced that it is the responsibility of one and all to ensure that the goals can be attained. The sectorial authorities were given specific responsibility to ensure that developments in each sector proceed in accordance with the national goals. In order that prioritisation of measures and resources, monitoring of developments and actions in case of need may be successful, the Government must express these goals in specific terms, i.e., as targets and as measurable timed targets, i.e., staged targets. In order that these aspirations may be realised, it is necessary for natural and cultural heritage assets to be fully integrated in the work of each sector.

The system integrates and monitors natural and cultural heritage assets in the work on infrastructure. This enables the Swedish National Road Administration and the Government to set up goals and to check that the planned measures are carried out and the goals are attained.

The system is in four parts:

1. A principle for national staged targets – the proportion of roads which shall satisfy specified quality requirements
2. Quality targets and measurable criteria – the 15 national environmental quality targets are expressed in specific terms with reference to the activity, and state what the Road Administration shall contribute in order that the national environmental goals may be attained.

3. Application of the quality targets and criteria in infrastructure work – adjustments to existing road management processes (long-term planning, road planning and procurement of road management contracts).

4. Principles for monitoring and quality assurance – monitoring of the specified targets at three levels: 1) the proportion of roads or maintenance districts which satisfy the quality requirements, 2) individual road projects, maintenance districts, maintenance plans, etc., (3) general indicators such as animals killed by traffic.

Fig. 1. Overview of the parts of the “goals-and-measures method.”

The method implies:
- Control and monitoring via one or a few staged targets at the national level.
- A common structure, but quality targets and criteria adapted to the different modes.
- No need for new planning processes.
- In long-term national and regional infrastructure planning, measures affecting natural and cultural heritage assets in the transport system can be considered in relation to other needs such as traffic safety measures, measures to increase bearing strength, etc.
- New knowledge can be integrated into targets and criteria without the need to modify the system.
- Natural and cultural heritage values are integrated into road planning and maintenance processes and are considered in relation to other targets.
- Monitoring at all levels will be specific, clear and informative.

**National Staged Targets**
These are not directly coupled to natural and cultural heritage assets. They are indirectly coupled to these assets by virtue of the fact that they describe a proportion of the Swedish road network that shall have the desirable qualities expressed in terms of quality targets and criteria. These are formulated in accordance with the principle:

*By the year 2007, 90 percent of newly constructed roads shall achieve the quality requirements for the natural and cultural heritage assets.*

*By the year 2007, 40 percent of the maintenance districts shall achieve the quality requirements for the natural and cultural heritage assets.*

*By the year 2010, 15 percent of the existing road network shall achieve the quality requirements for the natural and cultural heritage assets.*

Through indirect targets at national level, only a few targets need be set up. It will be unambiguous and easy for these to be reported, controlled and monitored. A clear balance between the target areas and the allocation of resources is also possible. Changes in quality requirements due to new knowledge need not affect the entire system.

**Quality Targets and Criteria**
With reference to the national environmental quality targets, the national goals for a sustainable transport system and the activities of the road transport system and its impact on natural and cultural heritage assets, a quality that the road infrastructure shall achieve has been defined. This level is defined through a hierarchy of targets. This is based on four overriding landscape classifications, each of which is expressed in terms of an
overarching target formulation. They have been interpreted in terms of specific quality targets, which are in turn defined by measurable criteria.

The quality level that is defined in this way is based on the best knowledge available at present. Owing to the structure of the target hierarchy, new knowledge can be easily incorporated without the whole system being affected.

The quality level is to be regarded as the level that the transport infrastructure can reasonably achieve, and in this way makes it possible for the national environmental targets to be achieved, provided that the other affected sectors, such as forestry and agriculture contribute with those components that they can influence.

Integration in the Road Management Processes

The quality targets are integrated into the planning, design and operation and maintenance activities through adjustments to the existing processes of the Road Administration. The most important change is that the processes shall be target controlled. For new construction, the quality targets and criteria function as a support in formulating project targets for the natural environment and cultural heritage qualities affected in the specific case. The level of aspiration for these qualities can and should be determined in consultation with those concerned and the regional and local authorities (county executive board and municipality). They also act as a check list which guarantees that the general quality level is reached.

For the operation of the road system, the quality targets are used in formulating targets, “maintenance district targets,” which shall be achieved within the maintenance district concerned. The level of aspiration for these qualities can and should be determined in consultation with the regional and local authorities (county executive board and municipality).

For the existing road network, the quality targets and criteria are used in describing a desirable condition in terms of “condition targets” which should be achieved. The condition of the road concerned can be compared with this and defects can be identified (defect analysis). The measures needed are described and costed. This will in turn serve as input data for the long-term planning of measures, during which measures affecting the natural and cultural heritage assets can be considered in relation to other needs.

Monitoring

On the local and regional level, the design, operational and condition targets make it easy to monitor the situation of the natural and cultural heritage assets in the transport system in a clear and specific manner. This is done for newly constructed roads, for maintenance districts and for the existing road network on a county or regional level. On the national level, it is the proportion of roads which satisfy the specified targets that is monitored.

Monitoring is supplemented with following up on a number of key factors/indicators. Examples of these are animals killed in traffic on different road types and in different landscapes, traffic mortality of certain species especially exposed to traffic, such as otters and badgers and population density of certain species which indicates fragmentation effects etc. Cooperation with the national environmental surveillance system is possible.

Application of the Method in Road Management – Principles

The goals and measures method is thus based on national quality goals and criteria. These express the least quality level for natural and cultural heritage assets which the Swedish road network shall achieve in order that Sweden may in the long term attain the overarching environmental quality goals, e.g., dynamic forests, a rich cultural landscape, etc.

The quality goals and criteria express what (which qualities) it is that must be taken into consideration in infrastructure work, and give overarching recommendations at a general level for measures and measurements to be applied with respect to the minimum aspirations which shall be achieved. The quality targets and criteria are then adapted to the regional and local conditions relating to each individual measure, preferably in cooperation with the county executive boards and municipalities. In the three most important activities of infrastructure work – long-term planning/action planning, road planning and operation – the quality targets are converted into targets that apply to the activity concerned. By means of this process, the project and the activities are subjected to target control. (figure 2)
Long-Term Planning

The quality targets are the starting point when the desirable long-term state of the existing road network is formulated for important natural and cultural heritage assets. It may be a matter of important qualities, such as avenues, bridges that are national monuments, and species-rich roadsides. The desirable quality is expressed in terms of a condition target for the quality concerned. The measures that are undertaken are in all cases determined by the present state of e.g., an avenue. The difference between the actual and desirable state, i.e., shortcomings, determines the need for a measure. The aggregate need for measures forms the basis of long term resources planning (figure 3).

Fig. 2. Schematic representation of the application of quality targets and criteria in the example of road planning.

Fig. 3. Application of the "goals and measures" method in planning measures/policy. The general quality targets for the existing road are adapted to the region concerned. The result is a condition target for important natural and cultural heritage assets which are affected by the existing road. The present state regarding the asset concerned is analysed with respect to the condition targets. The need for remedial measures revealed by this defect analysis is used as input data in the planning round for measures and in long-term planning. A decision regarding priorities for different areas is made by the Government and Riksdag when allocating resources for measures to be taken in the transport sector. The actual condition of the road is inspected and compared with the condition target.
Operation

Maintenance of the State-maintained road network is carried out by contractors. The road network is divided into a large number of areas, maintenance districts, the maintenance of which is put out to tender and contracts are usually awarded for three to five years. What the contractor shall do and the quality that is to be achieved is expressed in terms of performance requirements.

Before the maintenance in a district is procured, a survey is made of the natural and cultural heritage assets that are dependent on, or affected by, maintenance operations. With the national quality targets, regional aspirations and the local situation in the maintenance district as the starting point, targets are formulated for the district, and these are used as the basis for the performance requirements specified in the tender (figure 4).

Road Planning

Road planning is in most cases initiated by a problem or an identified defect that affects road transport. In order that environmental issues in general and natural and cultural heritage assets in particular may be integrated in the planning process, it is essential that the problem or shortcomings in quality be highlighted at the preliminary study phase: What is to be achieved? (project target). (No investigation is made at this stage as to how this is to be done). Project targets for natural and cultural heritage assets are formulated with reference to the national quality targets and criteria, regional and local aspirations and requirements. Initially, these also express what is to be achieved or retained (but definitely not how this is to be done). It is only after this that the process enters a phase where a study is made as to which measures are most effective and best satisfy the specified project targets. Project targets shall comprise accessibility, traffic safety, opportunities for regional development, as well as equal opportunities and environment (figure 5).
The project targets formulated in the preliminary study are the targets that shall apply for the project. In the subsequent stages the original targets are developed and converted into tangible form as knowledge in the project develops (figure 6).

It is only in exceptional cases that new targets which cannot be referred to the project targets formulated in the preliminary study shall be included. Targets formulated at a general level may be so detailed that they can be directly applied in the construction documents (see the example of road culverts in the figure 6).

Fig. 5. Application of the “goals and measures” method in road planning. The general quality targets for new roads are adapted to the road project in hand with reference to the assets in the area. The results are project targets which express which natural and cultural heritage assets shall be achieved/retained in the landscape when the communication problem concerned has been solved, possibly involving new construction. An environmental impact assessment of the proposals is performed in view of the project targets but also in a broader perspective, so that any overlooked serious impacts may be highlighted. Developed methods such as knowledge of, and recommendations for, measures that will alleviate the impacts, such as animal crossings, are required to assist performance of impact assessments with reference to the targets in the early stages of planning. The results on the road when the work is finished are monitored with respect to the project targets.

The project targets formulated in the preliminary study are the targets that shall apply for the project. In the subsequent stages the original targets are developed and converted into tangible form as knowledge in the project develops (figure 6).

Fig. 6. Principle of formulating project targets. Project targets are local adaptations of the general quality targets and criteria. This adaptation may incorporate a value judgment, as in the example above, as to which animals may be negatively affected to a major extent by a road project in the area. In the example, the common lizard is such a species. As planning is developed in greater depth, the targets formulated in the preliminary study via requirements for animal crossings across the road alignment chosen are expressed in specific terms by specifications for crossings in the construction documents. These targets in the construction documents must, practically without exception, derive from the targets in the preliminary study. Exceptions are general quality targets that have been formulated in such a specific way that they can be directly applied in a certain planning stage.
Monitoring
At the national level, the proportion of new roads, existing roads and maintenance districts which satisfy the quality targets regarding natural and cultural heritage assets shall be compiled. As mentioned above, the quality requirements to be achieved are to be found in the general quality targets and criteria. It is essential to remember that these express the quality which is to be attained nationally. This level is reached if the proportion of roads, which the Government and Riksdag have specified shall satisfy these requirements, is actually achieved. This implies that the results of measures must be monitored only with respect to the project targets, maintenance district targets and condition targets which originate from the general quality targets. If a road does NOT achieve these qualities, this may be serious as far as local conditions are concerned, but it is not disastrous for the entire road network. It is on the other hand always necessary to report the results even if they do not satisfy the requirements, and the reasons for this must be set out. Monitoring must also be able to follow developments with regard to the assets involved. One and the same asset must not far too often be the one for which the quality has not been achieved.

Fig. 7. The principle of monitoring. The annual reports which the transport management authorities submit to the Government and Riksdag set out the proportion of roads/railways, etc., which satisfy the quality requirements specified for natural and cultural heritage assets. The requirements which must be satisfied are defined in the national quality targets and criteria. For activities such as road planning, maintenance and defect analyses in the existing road network, targets for the activity concerned are formulated with reference to these general requirements. On completion of, e.g., maintenance and road construction, the results of these analyses, etc., regarding the proportion of the existing road network and new roads which shall satisfy the quality requirements for natural and cultural heritage assets shall be compiled. As mentioned above, the conditions and also the quality of an existing road are monitored to find whether these targets have been achieved. The results are expressed as either yes or no. The proportion that satisfies the requirements is summarised and reported to the Government and Riksdag.

Tests, Further Development and Implementation
Further method development is taking place in seven parallel stages (figure 8).

1. Test of the method in actual road management projects. To start with, at least one test project is carried out per region.
2. Test projects are analysed in cooperation with the Swedish University of Agricultural Sciences (SLU).
4. Training and information.
5. Review and revision of quality targets and criteria in cooperation with the Central Board of National Antiquities and the National Environment Protection Agency.
7. Quantification of the national staged targets in collaboration with the regions of the Swedish National Road Administration, i.e., compilation of a proposal, on the basis of condition assessments and defect analyses, etc., regarding the proportion of the existing road network and new roads which shall satisfy the quality requirements for natural and cultural heritage assets. This proposal is submitted to the government for decision.

Further method development on the basis of tests in actual road management projects will be carried out up to year 2005. Since more and more planning projects apply the method, a lot of training and implementation also take place.
The first test projects were carried out and analysed in 2002 and the first half of 2003. Test projects have been carried out in new investment projects, in conjunction with procurements for maintenance districts and in long-term planning that is performed in 2002/03 and shall be decided by the Government in 2004. In conjunction with long-term planning, the regions of the Road Administration have formulated quality targets, and via condition descriptions and defect analyses identified the need for measures in regard to some selected important natural and cultural heritage assets in the existing road network. These selected assets have been avenues, road maintenance in areas with highlighted high value assets, obstacles to the migration of fish in watercourses, facilities for endangered species, such as amphibians and otters, to cross roads, species-rich roadsides, roads and bridges of special historical value, and small objects of cultural merit (milestones, signposts, etc.).

As regards maintenance, the method has been applied in some maintenance districts which were put out to tender. The natural and cultural heritage assets in the maintenance district have been described, targets for important assets have been formulated where these are affected by the activities of the Road Administration, and maintenance standards which the contractor has to satisfy have been formulated in the form of performance requirements. In road planning projects, the method has so far been tested in several types of road project, ranging from large new construction projects to improvement measures on existing roads. The way test projects were selected was that the regional office of the Road Administration submitted proposals for suitable projects and the project was then selected in consultation with the head office of the Administration. In this way, test projects had completely different conditions, which were expected to yield a broader spectrum of experiences. The investment projects were in different stages. Many projects were chosen because the natural and cultural heritage assets were of high value and complex, which made it difficult for road schemes to be put forward. None of the test projects was a completely “new” project. Preliminary studies had been made for most of them, and in some cases these were repeated because the solution proposed had not been accepted by e.g. the county executive board and the municipalities. The conditions in the selected test projects thus provided limited opportunities for an open-ended and problem-oriented process, which made it more difficult to find new solutions and alternative road alignments. However, the tests within maintenance districts provided more scope for an open-ended process since these were facing a new procurement process in which the performance requirements in all maintenance districts would in any case be scrutinised.

The test projects have passed through one or more planning stages, but as yet there is no completed road project in which the method has been applied throughout, i.e., from preliminary study to a completed road. An analysis of the application of the method in road management processes has been performed by the Department of Landscape Planning, Ultuna, of the Swedish University of Agricultural Sciences (SLU).

**Results**
The aim of the above analysis was to answer questions relating to both the conditions for successful implementation and satisfactory results of the method, and the processes which may be thought to influence
effective implementation. The analysis has been carried out through interviews with those involved in the implementation of the test projects and through studies of the documents and results. The analysis has also studied whether the method satisfies the requirements and expected advantages described before. The actual work, the perspectives of the players and coupling to the EIA have also been examined.

*It functions all the way from national level to activity level?* The analysis gives no answer to this since no project has carried out the entire process from planning to realisation (Lisitzin, Ljung 2003).

*It specifies qualitative and measurable targets for the natural and cultural heritage assets that affect the transport system?* The quality targets and criteria can provide good support for the expression of the natural and cultural heritage assets in tangible terms, but they depend on how the targets are applied. Generally, lack of experience in working with targets and target-controlled processes is perceived as a serious drawback. It is, however, evident that awareness of the targets opens up both opportunities and difficulties. The targets are instrumental in providing a common focus and a common conceptual apparatus. The criteria create awareness of why the choices and priorities arrived at have been made (Lisitzin, Ljung 2003).

*Makes possible for a balance to be struck between target areas, both at national level and for each individual measure (investment projects, maintenance and management)?* It has not been possible to analyse how well a balance has been struck between the targets of different interests, but it is clear that the method has made it easier to strike these balances (Lisitzin, Ljung 2003).

*It clearly places the responsibility for all areas of interest on the agency that has to consider the problem, and the agency that carries out the planning process?* The method makes it easier to create a clear and well-structured planning process in which the right issue is dealt with at the right stage. Issues are often structured at an earlier stage than before, and the focus is often moved from negotiations between different interests to a more results-oriented discussion. This, in turn, makes it easier to arrive at creative solutions. The method does not automatically result in a more problem-oriented approach. This would seem to require better support, both in the form of incentives from the overarching planning process (policy planning and planning of measures) and during implementation of the individual project. (Lisitzin, Ljung 2003).

*Guarantees equal treatment of natural and cultural heritage assets and other interests?* Treatment of issues concerning natural and cultural heritage assets is different in the test projects from before, but it is not yet possible to decide whether this change is for the better since no project has as yet been carried to the construction stage. So far during the stages which have been completed in the test projects, the method has mainly highlighted natural and cultural heritage assets and has enhanced proficiency (Lisitzin, Ljung 2003).

*It contributes to a good decision base and decisions that are fully cognisant of the impacts?* Yes, but the process of formulating targets may at times be seen as very laboured. However, this is very likely a matter of training and habitual action patterns. Targets on which all are agreed makes the use of the decision base easier since existing natural and cultural heritage assets are placed in the same context (Lisitzin, Ljung 2003).

*It enables costs to be calculated?* Here the results are unanimous in the admittedly few test projects which have come so far in the process that the targets have resulted in clear requirements (the "how" target). It is definitely possible to calculate the costs of measures associated with natural and cultural heritage assets (Lisitzin, Ljung 2003).

*It encourages greater dialogue, local influence and a holistic approach?* The analysis does not provide a uniform answer, but the method has resulted in a greater sense of belonging among the players and has created a need to involve the players in a new and more active role. It has become possible for different perspectives to be expressed, and in this way the process can be said to promote influence on a general level, even regionally and locally. But there is an evident risk that the process will be promoted and dominated by experts (Lisitzin, Ljung 2003).

**Conditions in the Associated Areas**

The test projects have demonstrated that the general fundamental expertise is to be found among consultants, the authorities and organisations concerned, but that at the same time there is a need to develop expertise so that sound data may be produced, good project targets may be formulated, and the method may be applied properly. It is further necessary to develop a procedure for the production and structuring of good data and for the formulation of good project targets. Dialogues with the associated areas have become more specific and of greater depth. A difference has been revealed between cultural heritage assets and natural assets. Players from the authorities for the preservation of cultural assets have been more positive, active and creative. The reason for this may be that players from the preservation authorities realise that they are in great need of
new methods, while those dealing with natural assets feel safe with the established methods and materials (Lisitzin, Ljung 2003).

**Practical Work**
Application of the new method has generally been perceived initially as cumbersome, and that this necessitates a shift towards more work in the early phases of planning. It is, however, generally realised that the greater initial work has been recouped in the later phases in the form of better dialogues, concretisation and a clearer structure in dealing with natural and cultural heritage assets. On the whole, those interviewed have positive experiences with the method. The process which the method advocates is considered necessary. The reason that the method is regarded in a positive light is both that it is a good way of working, and also that it is a working procedure which they have to adopt and which is already applied in other areas of society (Lisitzin, Ljung 2003).

**The Perspectives of the Players**
Most of the players are in favour and consider that they have taken part in stimulating work, work that they want to continue doing. They have, however, largely had the feeling that this is still work for experts of different kinds, and it has not yet been possible to get the public and non-profitmaking organisations involved to any major extent (Lisitzin, Ljung 2003).

**Coupling to EIA**
Through the targets, the method provides greater opportunities to judge the impacts of different proposals. The process also gives better support for the formulation of clear requirements for the next stage of planning, while at the same time it is suggested that there is a need for better support and the development of methodology at the interface between the EIA and the planning process.

**Discussion and Conclusions**
It is not possible to draw very reliable conclusions from the available data which are of relative little scope. However, the results of the test projects clearly suggest that the method enhances clarity and awareness of natural and cultural heritage assets, that it breaks with the culture of negotiations among interests during the planning process in favour of a holistic approach and a more open-ended and results-oriented discussion, and that the method encourages interaction with other players by virtue of the targets which are expressed in tangible terms and are based on common concepts. The results also demonstrate that it is easier to strike a balance between target areas, and that the method makes for a better decision base. On the whole, the players involved in the test projects are very much in favour of the method, even though the reasons for this vary (Lisitzin, Ljung 2003). Regardless of the reason, it is clear that it is essential for those involved to be able see the intention of a new working procedure and the reason for its introduction. This necessitates training and the production of information material. To sum up, results so far are very positive, and the method shows great potential for truly integrating qualitative values such as natural and cultural heritage assets in road management processes.

The test projects also highlight the need for further development in several areas of the method. What is without a doubt most important is to develop knowledge of, and support for, work with project targets and their formulation. Above all, knowledge is needed of how to work with and formulate targets in complicated processes in which targets are progressively developed and expressed in specific terms, from the overarching quality level ("what" targets) in the preliminary study to the measurable concretisation of the "what" targets in the later stages of planning ("how" targets). One of the test projects also shows that problems may arise in assessing whether the proposed measures ("how" requirements) really satisfy the quality target originally formulated in the preliminary study (Lisitzin, Ljung 2003). The Road Administration and the authority concerned may arrive at different assessments. Procedures and practices must be developed for dealing with such cases. One possibility is to refer the measure to the Ministry concerned for decision. The analysis consistently demonstrates that there is great inexperience and lack of knowledge as regards to working with specific targets, and that there is a great need for support and aids. The same also applies to a certain extent regarding the production and formulation of descriptions for natural and cultural heritage assets as the basis in formulating project targets and in analysing the impacts of the proposed measures in relation to the project targets in the EIA. Furthermore, the interface between a target-controlled planning process and the EIA is perceived as lacking in clarity and hard to understand.

The new working procedure which the method entails has been received very positively by those engaged in the test projects (Lisitzin, Ljung 2003). At the same time, they are of the opinion that, in order to justify the implementation of a new method, it is important that the players involved in the projects should be able to see the coupling between the targets of their own project and the national targets more clearly than has been the
case in test projects carried out so far. It is therefore essential for implementation that routines for monitoring are produced without delay and are presented in the method descriptions.

The test projects also show quite plainly that many problems, which are not directly coupled to the method and cannot be solved by modifying this, remain to be solved. Examples of such problems are the expertise and ability of the users and shortcomings in institutional support (Lisitzin, Ljung 2003). All project managers are not suited to leading complicated processes with the aim of finding open-ended solutions to problems associated with the need for communications in society. Many see their roles as planning for the construction of a road, and are more suited to leading projects in the later stages of planning when the proposed methods have been decided on. Nor can the method solve problems associated with the overriding long-term planning where, in the course of policy deliberations, it is often discussed (and decided) that new roads shall be constructed. The method demands that scope and opportunity are given for a more open-ended search for solutions to communication problems.

Through the clear exposition of the problems and the overview which the project targets provide, and the common conceptual apparatus which this creates, the method provides good opportunities for greater participation by the public and non-profitmaking organisations. However, there is a great risk that these good opportunities will not be realised and the process will continue to be dominated by experts, unless methods and aids are developed so that the opportunities provided can be put to good use.

The new approach that the method demands from nature conservancy and cultural heritage preservation agencies has not been fully accepted. In order that a problem-oriented and target-controlled work may be possible in the process, it is essential to adopt an approach that regards the natural and cultural landscape as a dynamic entity where cultivation and thus the development of the landscape shall take place so that important qualities, functions and relationships are preserved or developed. A static, almost museum-like approach to the landscape still dominates which regards the landscape as something which must be protected and safeguarded from human activities. The results suggest that cultural heritage preservation has progressed a little in its development (Lisitzin, Ljung 2003), but it is essential that a serious dialogue should take place within nature conservancy and cultural heritage preservation agencies, and between these and developers.

**Biographical Sketch:** Lars Nilsson is the environmental director of the Swedish National Road Administration. He has a P.h.D in zoophysiology and has worked as a scientist at the universities of Stockholm, Leiden and Uppsala. He has also worked as a political advisor for the minister of transport and communications.

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