Rational environmental goals and sustainable planning

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Abstract

In Sweden planning towards ecological sustainability starts out from a system of environmental objectives adopted by Parliament in the late 1990s. The objectives express what environmental quality society should aim for within a generation, and are designed to guide decision-making in all sectors of society. In order to form a solid basis for planning towards ecological sustainability, the objectives must meet two types of conditions. First, they must have the capacity to guide and motivate those who are responsible for their implementation. To do so each objective must satisfy a set of rationality (functionality) criteria for individual goals: precision, evaluability, approachability, and motivity. Second, taken together the objectives must constitute a rational (functional) operationalization of the ecological dimension of sustainable development. For this to be the case the goal system must be coherent. An application of the suggested conditions to three Swedish environmental quality objectives illustrates some of the difficulties that are associated with the Swedish system of environmental objectives and ultimately with the whole idea of using goals in environmental management.
Keywords: goal setting, environmental objectives, precision, evaluability, approachability, coherence.

1 Introduction

In Sweden planning towards ecological sustainability starts out from a system of environmental objectives adopted by Parliament in the late 1990s [1]. The objectives express what environmental quality society should aim for within a generation, and are designed to guide decision-making in all sectors of society.

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In the government's view, management by objectives (MBO) is the most effective way of implementing a broad environmental strategy involving participants in all sectors [2]. However, for MBO to be effective at least three conditions must be met: the goals must be formulated in a rational (functional) way, there must be an adequate process of assessment and evaluation in force, and there must be a continuous dialogue between the goal setter and the implementer [3]. Despite the fact that objectives are frequently used in environmental management, little has been written on the first of these conditions; what properties environmental objectives should possess in order to be rational. In management theory [4-6] and psychology [7] writers have proposed desirable properties of individual goals. Very often the suggested criteria can be captured by the SMART acronym, according to which goals should be Specific, Measurable, Accepted, Realistic, and Time-bound. An attempt to explain and justify the selection of a particular set of goal criteria was made by Edvardsson and Hansson [8]. In our view, to be rational goals must have the capacity to guide and induce agents to act in ways that further their realization. Individual goals have this capacity when they are precise, evaluable, approachable, and motivating. In addition, for goal systems to have this capacity they must be coherent.

In this paper the criteria of precision, evaluability, and approachability are applied to three environmental quality objectives. The criterion of precision is applied to the objective *A balanced marine environment, flourishing coastal areas and archipelagos*, the criterion of evaluability to the objective *A good built environment*, and the criterion of approachability to the objective *A non-toxic environment*. The aim of the paper is to bring the rationality of these objectives up for discussion and to briefly point at some of the difficulties that are associated with the practice of using goals in environmental management. The analysis is based on the objectives and interim targets in force in the beginning of 2005, and does not consider the changes to the system of environmental objectives suggested by the Swedish government in May 2005 [9]. Before the analysis is presented, our theoretical approach to rational goal setting is described briefly. Throughout the paper the term "rationality" is given a rather wide interpretation. Readers who prefer a more restricted usage of the term may instead prefer to use the terms "functional" and "functionality" when the paper talks about "rational" and "rationality". A list of the three environmental quality objectives and their respective interim targets can be found at www.miljomal.nu, which is available in English.

2 Setting rational goals

According to our theoretical approach to rational goal setting agents typically set goals because they want to achieve the desired outcomes to which the goals refer, and because they believe that the very setting of the goals furthers this achievement. A goal that furthers its realization well is achievement-inducing. In order to be achievement-inducing the goal must both guide and motivate the agent to act towards its realization. Three types of properties determine the

capacity of individual goals to guide and motivate action: epistemic, ability-related, and volitional properties. Epistemic properties concern what the agent knows about the goal and the means to reach the goal. Two such properties determine the action guiding quality of a goal, namely precision and evaluability. The requirement of precision can be divided into three subcategories. A goal is *directionally* precise when it tells the agent in what direction to go in order to reach the goal. It has *completive* and *temporal* precision when it tells the agent to what extent and in what time the goal should be reached. Ability-related properties concern what the agents can do. At least one such property determines the action guiding quality of the goal, namely approachability (attainability). Volitional properties concern what the agent wants to do. At least one such property determines the achievement-inducing function of the goal, namely motivity. Motivity is the capacity of a goal to induce action in agents. How well a goal must guide and motivate action in order to be achievement-inducing depends on the circumstances of the particular decision situation. In order to optimise the rationality of the goal the four criteria therefore need to be weighed against one another.

For a system of goals to be action guiding it must also have a certain degree of coherence. In its basic sense "coherence" refers to some property that makes the elements (e.g. propositions, rules, principles, goals, and so on) of a set fit together [10]. The degree of coherence belonging to a particular set is determined by the relations that hold among the elements in the set [11]. Hence, the coherence of a particular goal system is a function of the relations that hold among the goals within the system, in particular the relations of support and conflict. A support relation holds between two goals when one goal facilitates achievement of the other. A relation of conflict holds between two goals when it is impossible or difficult to achieve both of them. Goal conflicts are problematic, since they make goal systems less action guiding.

In some situations the criteria for individual goals may conflict with the criterion of coherence. For example, it is possible that one way of avoiding goal conflicts (and hence strengthening the coherence of a goal system) is to formulate the individual goals in very ambiguous terms. By doing so goal system coherence can perhaps be obtained, but only at the cost of renouncing the requirement of precision. This shows that an assessment of the environmental objectives must observe both the criteria for individual goals and the requirement of coherence. The analysis in this paper, however, focuses on the criteria of precision, evaluability, and approachability, and the criteria of motivity and coherence will only be touched upon in passing.

3 A balanced marine environment: precision

The environmental quality objective *A balanced marine environment, flourishing coastal areas and archipelagos* is a complex landscape goal which embraces interim targets concerning the natural and cultural assets of the marine environment, biological diversity, noise reduction, and discharges of oil and

chemicals from ships. The analysis in this section starts out from the criterion of precision.

Already the title of the objective speaks of a marine environment in balance. However, the government does not explicitly define what is meant by "balance in nature". The idea that there is some sort of balance in nature is old and has been a background assumption in various academic disciplines for centuries [12, 13]. In its oldest sense "balance in nature" simply denoted an entirely stable, or constant, natural order [14, p. 32]. Such constancy was believed to exist when no obvious changes in the environment, e.g. in population sizes, could be detected. In the early twentieth century it became evident to some ecologists that the idea of homeostasis had to be abandoned in favour of a more dynamic concept [15]. The reason for this shift was the insight that many populations did not in fact remain in equilibrium. Instead, populations seemed to vary continuously, even in natural communities essentially undisturbed by man. Consequently, the classical equilibrium paradigm had to be reformed to allow for such variations. According to one view that emerged, "balance in nature" came to denote a state in which changes in the environment take place, but where it returns to some "normal" condition after perturbation. According to another, "balance in nature" came to denote a state in which irreversible changes in the environment take place, but where it has the capacity to remain within defined limits despite perturbation. Sometimes, the term "dynamic balance" is used to denote the former of these two states, whereas "resilience" or "persistence" is used to denote the latter [14, p. 33].

In a goal setting context the ambiguity of the term "balance in nature" could be problematic in several ways. First, as was indicated above it is not entirely clear what kind of state the term refers to. The multiple meanings that can be ascribed to the term render communication and coordination difficult, since agents could employ the same term and mean different things. Different interpretations of the goal could lead to disparate plans, or strategies, and disparate strategies could lead to heterogeneous environmental outcomes. Moreover, the heuristic role of the term may be misleading, since the idea of balance in nature traditionally has had a religious and cultural connotation rather than a scientific foundation [12]. Therefore, even if a goal that makes use of the term "balance in nature" is specified in some way, it runs the risk of being ridiculed because of its dated connotations.

Second, a goal which makes use of the term "balance in nature" can also be hard to evaluate, since it may be judged by using a variety of temporally and spatially specified scales. As was pointed out by Shrader-Frechette and McCoy, some of these scales do not easily lend themselves to measurement [14, p. 42]. For instance, how does one measure the stability of the Earth as an ecosystem over the last two billion years?

Taken together, it could be argued, these circumstances combine to make the goal insufficiently action guiding (and perhaps action motivating). However, it is also possible to defend the government's use of the concept of balance in nature. First, it could be argued that the use of imprecise goals is rational because they tend to enjoy a higher degree of acceptability than other goals. Political goals

usually result from a process of bargaining involving many conflicting interests. By formulating the goals in terms that each political party may interpret as she sees fit, agreements are more easily arrived at [16]. Goals that enjoy solid political acceptance, in turn, are rational in the sense that they guide planning over long periods, regardless of which political party is in the majority at a particular point of time. The benefits of such acceptance are also acknowledged in governmental organizations, and ambiguity is a central feature of much real life decision-making [17].

Second, by keeping the objectives somewhat imprecise greater scope for action is given to the implementing agencies. Such scope for action is important since it makes it possible for the implementer to adjust to circumstances that could not be foreseen when the goal was set [18]. This is also one of the core ideas behind MBO as a steering technique; that greater freedom as to the selection of means towards goal achievement should be left to the implementing agencies.

Third, despite its ambiguity the concept of balance in nature is *de facto* used in discussions of conservation and pollution [13] and in politically coloured literature on ecology [19]. Therefore, the concept is likely to possess at least some heuristic power. Perhaps the term "balance in nature" is simply more easily understood by, and communicated to, a broad audience, and therefore more likely to have a wider appeal, than terms like "persistence" and "resilience".

In summary, the objective *A balanced marine environment* illustrates one of the difficulties that are associated with the use of goals in environmental management, namely how to strike a balance between the requirements of precision, communicability, acceptability, and motivity. Since the environmental objectives are set to guide and motivate action towards sustainable development, some degree of precision is needed for the objectives to be functional. But how much precision is really needed, and what happens when ambiguous terms like "balance in nature" are used, are moot questions.

4 A good built environment: evaluability

The environmental quality objective *A good built environment* is a complex landscape goal, which mainly concerns the cultural environment. It embraces interim targets regarding spatial and community planning, the reduction of traffic noise, energy use, the extraction of gravel, the indoor environment, and waste disposal. The analysis in this section starts out from the criterion of evaluability.

The third interim target to the objective concerns the reduction of noise. The objective states that by 2010 the number of people who are *exposed to traffic noise* in excess of the target values approved by Parliament for noise in dwellings have been reduced by 5% compared with 1998. The target has been criticised for focusing on exposal to noise and for not paying due attention to people's actual experiences or the health effects of noise [20]. Measuring the number of people who are exposed to traffic noise, it is argued, is not an appropriate way of establishing whether the built environment is good or not. Noise nuisance simply cannot be measured solely in terms of decibel.

A reformulation of the target in the indicated way, however, would most likely make it more difficult to evaluate. It is simply harder to measure people's experiences of noise than to establish actual decibel levels. To render a reformulated target evaluable new methods of measurement would have to be developed. One method that has been suggested is to use questionnaires in which people indicate to what extent they have been disturbed by noise, for instance while sleeping with open windows [21].

The interim target illustrates another difficulty that is associated with MBO. Successful MBO presupposes that accurate and usable information about actual goal achievement is gathered and fed back to the goal setter. To be rational goals must, therefore, be evaluable. A common way of making abstract objectives evaluable is to operationalize them through sets of precise and measurable interim targets, each of which can be followed up and evaluated through indicators that focus on conditions that are quantifiable. The Swedish environmental quality objective *A magnificent mountain landscape* provides an example of this practice. The objective is operationalized through four interim targets, each of which is evaluated by means of quantitative indicators concerning the number of reindeer and wolverines in mountain areas, the number of all-terrain vehicles meeting noise standards, nitrogen and sulphur deposition, and so on [22].

The dependence of MBO on evaluability and the resulting tendency to rely heavily on goals that can be expressed in quantitative terms is problematic in several ways. The quest for direct measurability may lead policy-makers to neglect more complex indicators that express both quantitative and qualitative aspects of ecological sustainability [23]. This is unfortunate, since many aspects of ecological sustainability cannot be quantified, except in an arbitrary manner. For example, how does one express the goal to preserve the scenic beauty of archipelago landscapes solely in quantitative terms? When a goal is genuinely qualitative in nature, e.g. a goal that expresses aesthetic value, quantitative targets and indicators are simply not adequate enough.

According to Cortner the tendency to rely heavily on quantitative indicators has its roots in a fundamental political problem [24]. By focusing on what is quantitative, political problems that require open discussion of preferences are reduced to sets of technical problems, each of which is analysed in isolation from questions of value. Quantifiable goals and indicators may give the appearance of scientific objectivity, but they render invisible the social choices their selection entails. A strong focus on what is quantifiable may in the end lead to goal displacement [25]; in the case of the Swedish environmental objectives the content of ecological sustainability and good environmental quality is reduced to be about a particular number of hay-fields or fishery vessels, a particular amount of gravel extracted, and so on.

In summary, the objective *A good built environment* illustrates a second difficulty that is associated with MBO and the use of goals in environmental management, namely the dependence of MBO on evaluability and the resulting tendency to favour goals, interim targets, and indicators that one can put numbers to.

5 A non-toxic environment: approachability

The environmental quality objective *A non-toxic environment* is a pollution goal which embraces interim targets regarding the reduction of health and environmental risks connected with the manufacture and use of chemical substances, the identification of polluted areas, and the establishment of guideline values for chemical substances. The analysis in this section starts out from the criterion of approachability.

A non-toxic environment is one of the most difficult environmental quality objectives to achieve within a generation. The reason for this is that several of the interim targets that operationalize the objective are difficult to reach on time [26, pp. 28-32]. The sixth interim target is among the goals that are acknowledged to be most difficult to achieve. Among other things the target states that polluted areas should be identified and investigated, and that by 2005 remediation should have begun at a minimum of 100 of the sites given highest priority. According to a report by The Swedish Environmental Objectives Council (SEOC), remediation is in progress at some 30 sites, which means that actual goal achievement is poor [27]. This certainly raises the question if the objective is realistic. The current poor goal achievement could be taken to indicate that the interim target has a low degree of approachability, or attainability. At the same time it could be argued that a hundred sites is not a great number considering the fact that some 35 000 polluted areas have been identified, among which 1 500 have been assigned to the highest risk category [26, p. 32].

On the one hand most writers seem to agree that goals should be possible to attain, or at least to approach. Goals must be realistic, it is argued, since it is unreasonable to adopt goals that are of no use in the selection of means towards their realization [28]. On the other hand psychological studies suggest that difficult goals result in better achievement than goals with a low degree of difficulty [7, p. 90], [29]. Several of these studies confirm that there is a linear relationship between the degree of difficulty pertaining to a goal and the level of performance displayed by the agent. The reason why hard goals have a better performance record is that such goals give rise to greater effort and persistence, at least as long as the goals are accepted by the agent [7, p. 29]. However, other empirical studies suggest that very difficult goals can be counterproductive [30]. According to those studies agents perform worse when they aim for goals that are very challenging than when they aim for goals that are challenging but not exceptionally difficult to achieve.

The studies suggest that a medium degree of approachability is probably most efficient in furthering goal realization. But how does the goal setter know when a goal possesses a medium degree of approachability? Such knowledge presupposes that the goal setter has access to sufficient information on which the goal can be based. However, that is rarely the case. As was pointed out by Simon [31] and Lindblom [32] public policy decisions can seldom be based on perfect information. Decisions are instead regularly made on a rather intuitive basis with no complete or systematic knowledge about the situation at hand. This means

that the prospect of selecting an optimal goal is often substantially circumscribed.

Lack of adequate information and knowledge is particularly common in the environmental context, where many factors in combination give rise to negative effects on the environment. As regards pesticides, Falconer has for example listed a number of factors that challenge the development of an adequate environmental policy [33]. Such policy is difficult to develop because (1) several contaminants with different physical, chemical, and eco-toxicological profiles are involved, (2) there are many potentially affected ecological components, (3) there are many different contaminant sources, (4) there are many potential synergies between different contaminants, and so on. Ignorance is also recognized as a major obstacle to the realization of the objective *A non-toxic environment* [34]. Lack of adequate information and the complexity of the problems involved make it difficult to point out an appropriate degree of difficulty for environmental objectives in this particular area.

In summary, the objective *A non-toxic environment* illustrates a third difficulty that is associated with MBO and the use of goals in environmental management, namely that of setting rational goals in the face of ignorance, or great uncertainty.

6 Conclusions

Effective MBO implies that it is possible to set rational goals. The analysis in this paper suggests that some of the environmental objectives may not be sufficiently rational given the criteria of precision, evaluability, and approachability. An application of the criteria to the environmental objectives points out some of the difficulties that are generally associated with MBO and the use of goals in environmental management.

First, effective MBO presupposes that a balance can be struck between the requirements of precision, communicability, acceptability, and motivity. There are several reasons for setting imprecise goals. By doing so agreements among disunited parties may be more easily arrived at, and greater scope for action is given to the implementing agency. Moreover, some ambiguous terms like "balance in nature" could be more easily understood by, and communicated to, a broad audience than terms like "persistence" and "resilience", and hence have a higher degree of acceptability and motivity.

Second, effective MBO presupposes that accurate and usable information about goal achievement is fed back to the goal setter. The resulting tendency to focus on goals and indicators that can be expressed in quantitative terms is unfortunate, since there may be aspects of ecological sustainability, e.g. concerning aesthetic value, which are not quantifiable

Third, effective MBO presupposes that goals with a medium degree of approachability can be set. To hit the right degree of difficulty the goal setter must have access to adequate information on which the goal may be based. Since such information is rare, the prospect of setting rational environmental goals is in practice considerably circumscribed.

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