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Stakeholder discourse and water management in a catchment in northern Italy

P. S. Lupo Stanghellini[1] **and D. Collentine**[2]

[1]Department of Invertebrate Zoology and Hydrobiology, Natural Science Museum of Trento, Via Calepina 14, 38100 Trento, Italy
[2]Division of Economics, Gävle University, 801 76 Gävle, Sweden

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Correspondence to: P. S. Lupo Stanghellini (paola.lupo@mtsn.tn.it)

Abstract

The Water Framework Directive (WFD; directive 2000/60/EC) was created to ensure the sustainable use of water resources in the European Union. A central guideline included throughout the directive is a call for the participation of stakeholders in the management of these resources. Involving stakeholders is an important step to ensure that catchment management plans take into consideration local experience in the development of these plans and the impact of the plans on local interests. This paper describes and analyses the results of a series of workshops to facilitate implementation of the WFD at a catchment level based on the stakeholder participation model, CATCH.

To test the usefulness of the stakeholder participation model CATCH for water management in a catchment area, a sub-catchment in an alpine valley in the north-east of Italy, the Alta Valsugana in the Province of Trento, was chosen as the setting for a series of workshops. In this valley water is fundamental for activities associated with agriculture, domestic use, energy production, sports and recreation. In the recent past the valley has had serious problems related to water quality and quantity. Implementation of water management plans under the WFD may lead to conflicts within the catchment between different stakeholder interest groups. Including stakeholders in the development of management plans not only follows the guidelines of the WFD but also could result in a more locally adapted and acceptable plan for the catchment.

A new stakeholder analysis methodology was developed and implemented in order to identify the relevant stakeholders of the area and then two sets of workshops involving the key stakeholders identified were conducted in Spring 2006. The CATCH meetings were a new experience for the participants, who had to deal with both the principles of the WFD in general and the participation requirement in particular. During the meetings, the CATCH model played a very important role in structuring the participatory process. It provided a general framework consisting of a sequence of steps that helped the participants to reach the goal of the process; the identification and evaluation of measures to improve water management in the catchment. This test of the

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CATCH model showed it to be a dynamic and flexible tool, useful for structuring and guiding the participation process, without imposing undue restrictions on influencing the outcome of stakeholder participation in a small catchment.

1 Introduction

The Water Framework Directive "constitutes the most important [European Union] initiative in the water field for decades" (Mostert, 2003, p 523). In order to achieve its ambitious goals, it calls for changes not only in the water sector, but also in many other areas, such as urban planning, industrial design, architecture, agriculture, landscape management, utilities pricing systems and water services. One of the most innovative aspects of the WFD is the provision for public participation in water policy-making. Public participation is assigned a key role in the directive, its main purpose being "to improve decision-making, by ensuring that decisions are soundly based on shared knowledge, experiences and scientific evidence, that decisions are influenced by the views and experience of those affected by them, that innovative and creative options are considered and that new arrangements are workable, and acceptable to the public" (European Commission, 2003, p 14). However, like many of the tasks of the WFD and, in particular the tasks concerning public participation, these principles are new and lack useable methodologies, tools or methods for supporting implementation. The aim of the research project described in this paper is to develop a methodology for public involvement that supports the provisions for public participation in the WFD and above all, that successfully includes stakeholders in water management decisions.

2 Stakeholder participation in natural resource management

Public participation has become an increasingly important aspect of natural resource management (Chess and Purcell, 1999; Lawrence and Deagen, 2001; Redpath et al.,

2002; Chase et al., 2004; Darnall and Jolley, 2004; Broderick, 2005; Charnley and Engelbert, 2005; Koontz, 2005). This is especially true in relation to issues concerning the management of environmental and health risks (Rowe and Frewer, 2000). In the Common Implementation Strategy for the WFD, the European Commission (2003) defines public participation as "Allowing the public to influence the outcome of plans and working process" (p 11).

Public participation is an interactive process that can take various and different forms, from limited consultation to active involvement in the decision-making process. Scholars (Arnstein, 1969; Pateman, 1970; Thomas, 1990; Berry et al., 1993; Thomas, 1993; Shand and Arnberg, 1996; Bishop and Davis, 2002; Edelenbos and Klijn, 2005) have developed various classifications of the different public participation forms. With respect to the WFD, Article 14 contains the most important provisions about public participation. This Article prescribes three main forms of public participation (European Commission, 2003), suggesting a classification similar to the one identified earlier by the OECD (2001a, b):

- *Active involvement*. Interested parties participate actively in the planning process by discussing issues and contributing to their solution.
- *Consultation*. Administrative bodies consult people to learn from their knowledge, perceptions, experiences and ideas. Consultation is used to gather information.
- *Information supply (Access to background information)*. The WFD only requires access to background information and no active dissemination of information. The latter is, however, essential to make the prescribed consultation and active involvement work.

While public participation advantages and benefits are universally recognised and its validity and usefulness in decision-making processes widely accepted, there are some limits and problems which characterize this approach.

Researchers have developed different frameworks aimed at evaluating the quality of participatory decision-making processes in natural resource management (Chess

and Purcell, 1999; Beierle, 1999; Rowe and Frewer, 2000; Lawrence and Deagen, 2001; Webler et al., 2001; Beierle, 2002; Darnall and Jolley, 2004; Charnley and Engelbert, 2005). Although the number of evaluation studies of the quality of participatory decision-making processes in natural resource management has been increasing, a common and shared evaluation framework has yet to be found. While some recommend that evaluations concentrate on the outcomes of the project others assign a higher importance to the process.

Beierle (1999) points out six outputs or "social goals" (p 81) that characterise a good public participation process in natural resource management:

- Educating and informing the public;
- Incorporating public values into decision-making;
- Increasing trust in institutions;
- Improving the substantive quality of decisions;
- Cost effective decision-making;
- Reducing conflict.

In contrast, Webler, Tuler and Kruger (2001) concentrate their attention upon the process instead of the output. Through the analysis of a case study about a forest planning process in northern New England and New York, they identify five features that determine whether a participatory process is good or not:

- The process should be legitimate;
- The process should promote a search for common values;
- The process should realize democratic principles of fairness and equality;
- The process should promote equal power among all participants and viewpoint;

– The process should foster responsible leadership.

There is a need for researchers to improve participatory approaches both with respect to the process and the outcomes, in order to gain as much as possible from public participation. The work described in this paper represents a contribution to the search for techniques to improve participatory methodologies.

3 The CATCH model

CATCH is a decision support tool aimed at facilitating stakeholder participation in water resource management on a catchment area level (see Collentine et al., 2002 for a more in depth description of the CATCH model and comparison with other types of participatory models). The model develops a methodology for structuring dialogue as a method for shaping and aiding stakeholder participation in the management process. The structure of the model operationalizes principles of deliberative democracy into a framework that promotes discourse and deliberation while maintaining a focus on organizational tasks. Deliberative democracy principles are fundamental to achieve two goals: first of all they legitimise the decision that are taken and make the decision process more transparent, and secondly they increase the cognitive knowledge for making decisions through the local, lay knowledge provided by participants.

CATCH is a qualitative tool; it uses interaction among people in order to generate data; it has been designed for use with small groups (six-twelve people) and it can be used as a complement for large group settings in a way similar to the use of focus groups as a complement to valuation studies. The result of the small group setting using CATCH can serve as information that may then in turn be used for revealing and shaping preferences in another small or larger group setting. The primary goal of the CATCH model is to develop a common set of definitions, a common language, which may serve over a period of time for planning, as well as approval of specific measures. In order to achieve this, socio-economic parameters and the relationships

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between these parameters are defined by stakeholders. In the CATCH model the role of values is central. The process builds on stakeholder values (or interests), which are constructed by the stakeholders themselves.

The core of the CATCH model is the development and the application of a series of matrices. The first step is the identification of the relevant socio-economic parameters which describe the relevant goals for evaluating management alternatives in the catchment area. The definition of the socio-economic parameters is a dynamic process. Stakeholders are required to define an inclusive but limited set of parameters, which may be used for evaluation. From an initial listing of possible objectives, which includes all suggestions made by stakeholders, the facilitator's task is to assist with consolidation of the list by looking for similarities between suggested parameters. If agreement is based on a consensual rule, then arguments and dialogue are the techniques used to arrive at a common set of parameters, which through their definition include the entire set of stakeholder objectives. The result is a set of commonly accepted definitions, which provide a language for stakeholders to use for deliberation over allocation and management decisions. The definition of parameters allows the inclusion of local knowledge and preferences into the model. It is important to point out that the list of parameters may be revised at a later stage and if at any point in the process it becomes apparent that either a parameter is redundant or missing, it is also possible to change the parameter definition.

Once a set of socio-economic parameters has been agreed upon, the next step is to evaluate the relationships between them, analysing what effect a change in one parameter has on the remaining parameters. The relationships are decomposed into two spatial components, regional and local effects, in addition to positive and negative changes in individual parameters to describe the range of the relationships. The local factor refers to the effect on the specific sites where the measures have a direct impact, a particular area in a sub-catchment for example. The regional factor is the impact on the entire catchment area. The range of the impacts is analysed by discussing how a negative change in one parameter may impact the other ones and then by following

up on this by discussing the effect of a positive change. Since there is no reason to assume that the impacts interact, each impact is discussed as a separate event. These relationships are analysed by constructing a series of matrices. There are four possible types of effects in the relationship between two variables: a positive effect (+) indicates that a change in the row variable leads to an increase in the column variable, a negative effect (–) indicates that a change in the row variable leads to a decrease in the column variable; an insignificant effect (0) indicates that a change in the row variable leads to an insignificant effect in the column variable; an indeterminate effect (+/–) indicates that it is not possible to establish which effect a change in the row variable has on the column variable (see Tables 2, 3, 5 and 6).

After constructing the series of matrices, the next step is the definition and evaluation of measures, with a process similar to the form used for defining and evaluating the socio-economic parameters. The first task is to define general types of measures, which may be of interest; their description may require additional input from experts or catchment interests groups. It is important to know how these measures are expected to affect change before the quality of the changes on parameters can be evaluated. At this stage it is sufficient to describe the measures generally, but in later stages the same method may be used to evaluated site specifically measures. This is one of the strengths of the model: it may be used for general planning of a more long run nature as well as provide an analytical framework for the evaluation of specific measures.

The measures are then evaluated against the socio-economic parameters. These relationships are analysed by constructing a matrix (see Tables 4 and 7). As in the matrices for the evaluation of the relationships among parameters, there are four possible types of effects in the relationship between measures and socio-economic parameters: positive, negative, insignificant or indeterminate. The definition and evaluation of the parameters serves to define the systems supported by water services in the catchment. Through collective definition of the parameters, valuation is extended from the individual level to a public level. The complexities of water service allocation decisions are captured in the model by analyzing the relationships between parameters, spa-

tially as well as quantitatively, and structuring this information into a set of matrices. Alternative management measures and strategies may be evaluated through the use of the matrices. The decision support for the stakeholders, provided by the model, is twofold: it serves as a structure for the analysis of the effects in the catchment for alternative allocation of services and, perhaps most importantly, it develops a stakeholder constructed language for discourse and deliberation over allocation alternatives.

While the design of the original CATCH model (Collentine et al., 2002) provides a useful tool to support stakeholder involvement in water management at a catchment level and provides a systematic method for developing management objectives as well as a method for evaluating individual proposals there have been problems in its implementation. A study in a catchment in Southern Sweden (Collentine et al., 2005) identified several of them. In particular, four weak points were pointed out that needed to be re-analysed and reviewed; stakeholder identification, stakeholder recruitment, definition of socio-economic parameters and workshop organisation.

In the original CATCH model it was assumed that stakeholders will always identify with groups of interests and as a result less importance was assigned to the method used for identification of stakeholders. However, the European Commission (2003) points out that the way by which stakeholders are identified is very important. It recommends performing a stakeholder analysis as a preparatory step of the participatory process because this analysis "reduces the risk of forgetting an important actor and will give an idea about the different angles from which the subject can be viewed" (European Commission, 2003, p 63). The European Commission (2003) suggests performing a stakeholder analysis at every stage of implementation of the WFD. The identification of stakeholders is very important and has a great deal of influence on the outcome of the implementation process. For this reason it is important to incorporate into the model, as a preliminary step, an appropriate stakeholder analysis methodology to identify stakeholders. The stakeholder analysis and recruitment method developed and used for the study described in this paper is based on the following set of principles.

The initial stakeholder analysis should be performed by a group of experts with a

good knowledge of the area chosen for implementation and of the subject of the experiment. To improve the quality of the results, however, it is useful to gain additional information and ask all the stakeholders identified to perform the stakeholder analysis as well. Furthermore, the stakeholders that are identified through the stakeholder analysis should be recruited for the workshops by asking every stakeholder (association, organisation, institution) to send one or two representatives to the meetings. It is important to let the associations, organisations, institutions freely choose the persons they want to send to the meetings. The associations, organisations, institutions have, in fact, all the information for choosing the most appropriate person, because they are familiar with the interests of their members and their employees, their willingness to participate in this type of experiment, their knowledge about the subject that will be discussed during the workshops and their availability of spare time.

In this way, the choice of a representative is the result of an internal process, which is developed within the associations. The people chosen to take part in the project are formally invested with the role of representative by their associations and this fact makes them responsible to the associations. This means that these people will probably not miss taking part in the meetings and try to do their best when there.

4 Application of the Stakeholder Analysis Methodology and Implementation of the CATCH Model

To test the usefulness of the CATCH model, a sub-catchment in an alpine valley in the north-east of Italy, the Alta Valsugana in the Province of Trentino, was chosen as the setting for a series of workshops (see Fig. 1). The Alta Valsugana has an area of 394.45 km^2 and a population of 45 653 inhabitants, spread out over twenty different political municipalities. The main economic activities are agriculture (mostly apple and berry production) and tourism. Secondary activities include animal grazing (cattle and sheep) and small industrial and manufacturing sectors. The main tourist attractions of the area are several small alpine lakes (the most well known are the lakes Levico and

Caldonazzo), where it is possible to swim and engage in other water based recreation, such as sailing, wind-surfing, diving and fishing. The Alta Valsugana is also quite well known for its thermal baths and resorts and a few small ski resorts in the mountains that surround the valley. However, tourism is mostly concentrated to the summer season. The Alta Valsugana is also an important route of communication as it connects Trento (the main city of the region) with Padova, Venice and other important cities of the Veneto Region. Transport occurs on a highly trafficked motorway and a railway which both follow the Brenta River, the main tributary that runs through the Alta Valsugana. In addition, there are also a few small hydro power plants operating in the valley.

In the Alta Valsugana, water is fundamental for activities associated with agriculture, domestic use, energy production, sports and recreation. In the recent past the valley has had serious problems related to water quality and quantity. The lakes and rivers have had serious pollution problems, for example the lake of Caldonazzo suffered from eutrophication. Water scarcity is also a problem in some of the municipalities during the summer season, the time of year when tourists are most numerous. In addition hydropower plants in the valley modified the run of some rivers, causing problems to fish life and to the ecosystems in general. Currently, most of the problems have been mitigated; all the wastewater discharges are treated, farmers use less fertilizer and pesticides and more restrictive regulation (a new minimum level for the outflow of water) was adopted to mitigate the problems caused by the hydro power plants. The water quality status of the valley is presently satisfactory, although possible to improve. Implementation of water management plans under the WFD may lead to conflicts within the catchment between different stakeholder interest groups. Including stakeholders in the development of management plans not only follows the guidelines of the WFD but also could result in a more locally adapted and acceptable plan for the catchment.

Even though the stakeholder analysis and the CATCH model are suitable to be implemented in small as well as large catchments, it was decided to work with a sub-basin instead of a river basin, because a sub-basin is easier to manage, given the resources, purposes and timing of the research project. A sub-basin around the lakes of Levico

and Caldonazzo was identified; it includes the two lakes and the network of their tributaries and effluents. Following the definition given in the WFD (Article 2(14))[1], the sub-catchment identified is coherent from a hydrological point of view. This means that the borders of the sub-basin area follow the network of rivers around the two lakes rather than the existing political administrative boundaries (see Fig. 2).

This sub-basin was chosen because it presents a diverse set of water uses: agriculture, tourism and recreation, animal grazing, small industrial and manufacturing activities and thus represents a suitable testing ground. Furthermore, even though, according to the data of the Division of Information and Environment Quality of the Environmental Protection Agency of the Autonomous Province of Trento, the quality of the water of the sub-basin is quite good, it needs to be improved or, at the least, to be kept at the current level. This requires serious efforts from all the stakeholders of the area. It was thought that in this particular situation the CATCH model could demonstrate all its potential and play a very important role in helping stakeholders structure the participatory process, in order to elaborate and evaluate measures aimed at improving the quality of water in the area.

4.1 Stakeholder analysis process

The first step in the implementation of the CATCH model was the use of the new stakeholder analysis methodology developed to identify the relevant stakeholders. This method had never been tested before it was used in this study in Winter/Spring 2006. Therefore, it was necessary to carefully organise this first application and it was designed and planned as an exhaustive and complex process. Through this process it was possible to first test, and then implement the methodology. The stakeholder analysis process was performed in three different phases. It was first tested and run by a

[1]The *sub-basin* is defined as "the area of land from which all surface run-off flows through a series of streams, rivers and, possibly, lakes to a particular point in a water course (normally a lake or a river confluence)" (Directive 2000/60/EC, Article 2 (14)).

group of experts, then tested and run by representatives of the municipal councils of the sub-catchment area, and finally run by the stakeholders of the sub-catchment area (with the exception of the representatives of the municipalities).

According to this new methodology, the stakeholders of the sub-catchment area were identified through the use of a brainstorming session performed by the expert group. Then in order to improve the results, the list of stakeholders obtained was submitted to all the stakeholders identified, allowing them to add or delete one or more stakeholders. After this step the methodology required that first the expert group and then the stakeholders of the area fill in a questionnaire with a list of stakeholders and to rank them on a scale of 1 (lowest) to 5 (highest) with respect to four attributes: *power*, *legitimacy*, *urgency* and *proximity*[2]. *Power* is defined as the past and present influence of a stakeholder in the decision and implementation phases of programmes, plans, rules, measures concerning water management, water use and water protection in the catchment, at the local, provincial, regional and national level. *Legitimacy* is defined as the feature according to which the claims, requests, concerns and interests of a stakeholder with respect to water management, use or protection, could be and can be considered appropriate, proper and eligible within the social system, with its values, common definitions and beliefs. *Urgency* is defined as *how much* a stakeholder is and was active and can demonstrate an effort to present as urgent as possible his requests and to ask for immediate attention during the decision and implementation phases of programmes, plans, rules, measures concerning water management, water use and water protection in the catchment, at the local, provincial, regional and national level. *Proximity* is defined as the state, quality or fact of being near or close in space to the catchment area.

The stakeholders who had scores equal to or higher than 3 for all the attributes were classified as *definitive stakeholders*; those who had only one or no attribute score

[2]These attributes are a development of the three stakeholders attributes identified by Mitchell, Agle and Wood (1997) in their stakeholder identification theory, which was evaluated and expanded by Driscoll and Starik (2004).

equal to or higher than 3 were classified as *latent stakeholders*; those with two or three attribute scores equal to or higher than 3 were classified as *expectant stakeholders*. Through this classification, the stakeholder analysis provided a method to establish the most appropriate level of involvement for each class of stakeholder. It is an adaptation of the classification system suggested by the European Commission (2003), which identifies three different degrees of stakeholder involvement: *co-operating/co-working*, stakeholders actually participate in and contribute actively to the process (i.e. active involvement); *co-thinking*, stakeholders who have input with respect to content and are sources of expert knowledge (i.e. consultation); *co-knowing*, stakeholders who do not play an active role in the process but should be kept informed of its progress (i.e. information supply).

According to the stakeholder analysis methodology the most appropriate degree of involvement for the definitive stakeholders is active involvement (co-operating/co-working). These stakeholders are the most important stakeholders and they should be included in the highest level of involvement. The appropriate degree of involvement of expectant stakeholders is consultation (co-thinking). This means that they should be consulted in order to gain useful information and opinions. The appropriate level of involvement for the latent stakeholders is the third (co-knowing), they should be kept informed. After this classification, it was possible to identify the stakeholders associated with active involvement (co-operating/co-working), to be involved in the implementation of the CATCH model. An example of the stakeholder analysis results is shown in Table 1.

Following the stakeholder analysis, a two round CATCH implementation process was organised. In the first round, representatives of the municipal councils of the sub-catchment (the homogeneous group) were invited to participate in the test and implementation of the model. In the second one, the other stakeholders of the area (the heterogeneous group), were invited to participate in the task of implementing the CATCH model. Each round was divided into a series of three workshops each. Each workshop lasted between two and two and half hours. The workshops were set for a

weekday, and after working hours (after 06:00 p.m.) in order to avoid the problems of lost work time and reduce the impact on stakeholders' free time.

4.2 Workshop results: Round 1

The first round of workshops took place in Spring 2006 and involved the representatives of the twelve municipal councils of the area. The participation rate was very high; eight representatives took part in the first workshop, nine in the second and eight in the third. Ten municipalities of the twelve that were invited to take part in the implementation process participated in at least one workshop.

At the first meeting the facilitator went through four presentations concerning the WFD, the provisions for public participation, the CATCH model, and a description of the implementation process. The stakeholders were then shown three maps: first the map of the sub-basin, a map describing the concentration of the different economic activities in the sub-basin area (farming, fruit growing, industry, handicraft, tourism and commerce) and a third map which described eco-systemic sensitiveness. This third map showed the areas with very low, low, medium high, very high eco-systemic sensitiveness. All these maps and data were shown in order to give stakeholders an overview of the socio-economic-environmental situation of the sub-basin.

After answering a few questions, the facilitator then asked the stakeholders to think about water uses, functions and values with respect to the sub-basin. This information would be used to define a limited (no more than six to eight) set of parameters. With respect to the original version of the CATCH model these parameters incorporated only two of the three dimensions of sustainable development: the social and the economic dimensions. In order to make the parameters more complete and inclusive, it was decided to introduce an environmental component. In this way the CATCH parameters would become socio-economic-environmental parameters and this would make it possible to capture all the three dimensions of sustainable development with the modified model.

In a brainstorming session the stakeholders analysed and discussed each of the

parameters identified and worked out the following list of parameters and definitions:

- *Household use*: drinkable water for domestic and sanitary use;
- *Use for agricultural activ*ities: irrigation;
- *Use for tourism and recreation*: landscape attractiveness, use for recreation and sports activities;
- *Use for fruits processing working activities*: refrigeration;
- *Biodiversity*: richness of animal and plant species;
- *Vulnerability of springs (quality)*: maintenance of the current quality;
- *Water scarcity (quantity)*: water scarcity.

It is important to remember that CATCH is aimed at consensus building, for this reason during the entire implementation process the facilitator always tried to obtain definitions and decisions upon which there was general agreement. The participants engaged in lively discussions about the parameters and definitions but in the end it was not difficult to agree upon a common list. During the discussion, stakeholders' knowledge of the geo-morphological features and economic activities of the area became apparent.

The second workshop began with a request by some of the stakeholders, who had thought more about the list of parameters after the first meeting, realised that something was wrong and asked if it was possible to make some changes in the list. The ensuing discussion which led to some minor adjustments in the parameter definitions, was a indication that stakeholders were very interested in the CATCH process. They assigned importance to what they were doing and because they believed that the project could be useful, they should be precise and careful and do *their best*.

After this discussion and redefinition of parameters the first matrix was completed, which describes what effect a positive change in each parameter has on all the other parameters (see Table 2). In this matrix, an increase in the use of water for domestic

and sanitary purposes (domestic use) is expected to have an insignificant effect on water used in agriculture, for tourism and recreation or for the processing of fruits as indicated by the zeroes in the respective box in Table 2. However, stakeholders pointed out that household water and the water used in agriculture fruit production come from different springs. An increase in the use of household water is therefore expected to have an insignificant effect on the vulnerability of springs, while it is expected to have a negative effect on biodiversity and on the availability of water (as indicated by the minus signs in these two boxes in Table 2).

After finishing the first matrix, a second one was built, which describes what effect a negative change in each parameters has on all the other parameters (see Table 3). As can be seen in this matrix, a decrease in the water used for recreational and sports activities is expected to have an insignificant effect on the overall availability of water, while it is expected to have a positive effect on biodiversity and on the vulnerability of springs (pluses in Table 3). Stakeholders indicated that a decrease in tourist pressure is expected to produce positive effects on biodiversity and springs. However, the stakeholders could not establish what effect a decrease in the use of water for recreational and sports activities would have on the water used for agricultural activities.

Upon completion of the second matrix, some stakeholders noticed that the rows and columns related to the water used for the processing of fruits had only zeros. This meant that both a positive and a negative change in the water used for fruit processing had insignificant effects on all the other parameters. In addition, both a positive and a negative change in all the parameters also had an insignificant effect on the water used for the processing of fruits. This observation led to a discussion among stakeholders with respect to the parameter used for fruit processing activities: refrigeration. It was decided that this parameter should be considered as secondary and be deleted from the socio-economic-environmental parameters list (which included the most important variables).

The third workshop began with a further revision of the socio-economic-environmental parameters list. Stakeholders made some comments about the impre-

cision of the definition of the availability of water (quantity): quantity of water overall available (springs, rivers, lakes, etc...). They argued that the term springs should be replaced by the term reservoirs, which was more suitable, in relation to the definition of availability of water. After discussion, an agreement was reached and the old definitions were replaced by the new ones.

Finally the stakeholders were asked by the facilitator to think about the relationships shown by the matrices and try to work out a limited set of measures aimed at improving the quality of water of the sub-catchment and, in general, for water management of the sub-catchment area. The discussion about measures was very active and lively. During the discussion a lot of information about the most serious environmental problems of the area came out; for example the stakeholders pointed out that, during summer, some municipalities had problems of water scarcity. It was also pointed out that, while some municipalities had an abundance of water, others had problems related to water scarcity. During the debate many different opinions and points of view about priorities were expressed. In the end partial agreement was arrived at on a list of measures:

- Improving awareness of citizens;
- Incentives to improve technology;
- A new pricing policy (an increase in water pricing when the consumption of water exceeds a certain amount);
- Reduction of losses of water;
- Creation of a basin-wide water distribution network (instead of the current municipal water distribution network);
- Installation of turbines on the channels of the water distribution network in order to recovery energy;
- Traffic reduction;

- Improvements in scientific research and technology which would lead to less polluting fertilizers and pesticides;
- Prolongation, extension of the tourist season, in order to spread out the tourist pressure over more months;
- Limits and restrictions on urban and industrial expansion (classification of the areas with serious environmental problems).

These measures were then evaluated against the socio-economic-environmental parameters, by constructing a new matrix as shown in Table 4.

As can be seen in Table 4, measures aimed at making citizens aware of the importance of water issues and of water problems are expected to have a positive effect on the water used for domestic use and agriculture, as well as on biodiversity and overall availability of water, while this measure is expected to have an insignificant effect on the maintenance of the current quality of springs (vulnerability of springs). The extension or prolongation of the tourist season is expected to have a positive effect on water used for domestic purpose and for tourism and recreation as well as on biodiversity and on the overall availability of water, while it is expected to have an insignificant effect on the maintenance of the current quality of springs (vulnerability of springs) and on the water used for irrigation (agricultural use). After the building of this last matrix there was a discussion about the results and an evaluation of the whole CATCH implementation round (see conclusions below).

4.3 Workshop results: Round 2

The second round of workshops took place in Spring 2006 and involved the heterogeneous stakeholders group which was composed of a set of definitive stakeholders identified during the stakeholder analysis. The participation rate was quite low, only seven representatives took part in the first and second workshops, and only five in the third. Only five stakeholders of the sixteen invited to take part in the implementation

process participated in at least one workshop. It is interesting to note that four of the five stakeholders who took part in the meeting were municipal or provincial institutional stakeholders (in other words *local government* stakeholders). No stakeholders from the private economic sector took part in the workshops. With respect to the participation rate of the local government representatives, it can be noted that four stakeholders out of five took part in the second round of the CATCH implementation process.

The first workshop of the second round was organised in the same way as the first workshop of the first round. Stakeholders worked out the list of the most important parameters and their definitions:

- *Purification*: processes aimed at restoring the quality of water;
- *Water quality (chemical, physical and biological)*: with respect to the limits and parameters established by the regulation in force;
- *Tourist pressure*: pressure by tourists;
- *Resident pressure*: pressure by residents;
- *Water use or consumption*: water used for domestic purposes or economic activities;
- *Landscape and recreational use of water*: use of the water and the environment for recreation;
- *Flow of rivers and streams*: quantity of water of rivers and streams;
- *Impermeability of the soil*: ability to recover the water that passes through the soil.

In the beginning of the second workshop some stakeholders asked to make some changes in the list of parameters. The changes suggested were specifications of terminology and agreement upon these modifications was easily reached. The second workshop resulted in two sets of matrices, as shown in Tables 5 and 6.

The third workshop started with some comments and remarks concerning the parameter permeability of the soil. The discussion was then extended to two other parameters: purification and recreational use. After updating the parameter matrices, stakeholders then worked out a list of measures to improve water quality and water management of the sub-basin. In this phase all the stakeholders participated actively and the following measures were agreed upon:

- Maintenance of a good waste collection system (in order to avoid waste abandonment);
- Improvements in the water treatment system;
- Monitoring water availability;
- Improvements in the irrigation system;
- Support of activities to inform tourists and residents (to make them aware of the environmental problems);
- Restoration (defined as the return to a natural condition) of artificial soils;
- Control of rain water (canalization, collection and sedimentation);
- Protection of wetlands;
- Promotion of research aimed at defining methods to evaluate the capacity of recharge and the environmental balance of the area.

These measures were in turn evaluated against the socio-economic-environmental parameters (see Table 7). This last workshop also ended with a participant evaluation of this round (described below).

4.4 Workshop results: a comparison between the two rounds

With respect to the parameters identified, in both the two rounds the participants based their parameters on the economic and productive uses of water in the sub-catchment area, as well as on environmental functions and values; the parameters they worked out also reflect the most important problems (or, perceived as the most important) of the sub-basin. Nevertheless the parameters identified by the representatives of municipal councils during the first round reflect a local perspective, based on a very good knowledge of the area, while the approach of the heterogeneous group (rest of stakeholders) is more technical and less local. In particular, the influence of the representatives of the Autonomous Province of Trento, who are technical experts, is clearly seen here. It is also important to underline that, while the representatives of municipalities live in the sub-catchment area, the technical experts of the second round of meetings do not live in the area. For this reason the parameters identified during the second round of workshops reflect a less local but more technical knowledge of the area.

The measures identified by the representatives of the municipalities are more articulated and detailed than the measures of the rest of stakeholders; nevertheless the measures have some common aspects: information of citizens and promotion of research. As noted in the discussion of the parameters, the measures worked out by the representatives of municipalities reflect a local perspective and knowledge. The measures identified by the rest of the stakeholders are a little more generic and quite technical. As underlined above, this is probably due to the fact that they are worked out by a group of technical experts who do not live in the area. These people have very good technical knowledge but a less detailed knowledge of the sub-catchment area.

It is important to note that while the measures of the first and of the second round of workshops are different, they are not in conflict. Furthermore, it is possible to assert that these measures are complementary. The plurality in points of view which characterised the two rounds, produced two interesting sets of measures, both of which try to

improve the quality of water using different solutions.

With respect to the participation, the rate during the first round of workshops was very high: ten municipalities out of the twelve (88,33%) participated in at least one workshop. With respect to the second round of workshops, the participation rate was lower: only five stakeholders out of the sixteen (31,25) participated in at least one workshop.

It is interesting to note that during the second round of workshops four stakeholders out of the five who took part in the meetings were *local government* stakeholders. For this reason, it is possible to assert that the protagonists of the CATCH implementation process were *local government* stakeholders. These stakeholders have had the formal power and the duty to decide about water management until now. As a consequence they feel responsible for water management toward citizens and they believe that decisions about water management are one of their duties. For this reason they were willing to participate in the CATCH workshops. The rest of the definitive stakeholders of the area (the Federation of Irrigation Consortia, Farmers Associations, Fruit Growers Associations, the Industrialists Association of the Province of Trento, etc. . .) probably shared the same idea and as a result decided not to participate in the workshops. This behaviour reflect a sort of *attachment to the status quo*: stakeholders, even thought they know that the WFD will introduce some innovative aspect about water management, find it difficult to accept these changes.

After analysing participation from a quantitative point of view, it is interesting to analyse it from a qualitative point of view. In general, it can be said that both the rounds of the implementation of the CATCH model were a successful experience: the stakeholders were willing to express ideas and opinions, to share knowledge and experiences and to cooperate. They took the CATCH implementation tasks very seriously and tried to do valuable work. Every stakeholder participated actively; there were a lot of lively discussion but consensus was almost always reached. The atmosphere was informal and friendly and it was easy to built trust among the various stakeholders.

During the first round, the fact that almost all the representatives of the municipali-

ties knew each other, shared knowledge and information and usually had to face the same problems, facilitated the creation of a trust and informal environment in which everybody felt free to talk and express ideas and opinions.

The situation that characterised the beginning of the first workshop of the second round of meetings was completely different, because the representatives of the stakeholders did not know each other, did not share the same knowledge and information and did not all live in the sub-catchment area. Nevertheless, the building of trust among of stakeholders was very easy and quick and the environment was friendly and informal. The only differences were that the discussions were a little less lively and that the participants in the second round of workshops were probably a little more timorous and timid than the representatives of municipalities.

5 Conclusions

The purpose of this study was to evaluate the effectiveness of the proposed stakeholder analysis methodology and the modified CATCH model in supporting stakeholder participation in management decisions related to the WFD. The CATCH workshops were a rather new experience for the participants, who had to deal with both the principles of the WFD in general and the participation requirement in particular.

With respect to the stakeholder analysis methodology, the method was considered to be clear and easy to understand by both the expert group and the stakeholders of the sub-catchment area. Nobody had problems with the definitions or with the voting paper. The stakeholder analysis methodology was a useful tool which was able to provide a clear picture of the stakeholders' environment. Classification of stakeholders was fundamental before the start of the participatory process, because this made it possible to both avoid the risks of forgetting relevant stakeholders and involving the stakeholders in a non-appropriate way. Through the stakeholder analysis methodology it was possible to obtain a precise, detailed and clear classification of the stakeholders and an indication of the most appropriate level of involvement. In summary, with respect

to implementation of the WFD, the stakeholder analysis methodology used in this study offers a valuable tool for their identification and classification. It supports choosing the right stakeholders for the right level of involvement for the appropriate phase of the WFD implementation process and thereby helps to avoid the risk for mistakes which could cause the process to fail.

With respect to the CATCH model, the stakeholders of both the round of workshops found it to be very rational and useful because it played a very important role in structuring the participatory process. It provided a general framework consisting of a sequence of steps that helped them to reach the goal of the process: the identification and evaluation of measures to improve water management in the catchment. The stakeholders who took part in the meeting found the CATCH method to be a useful tool to organise and structure public participation, avoiding the risk of a chaotic and confused discussion where it is impossible to reach a result. The CATCH model is extremely easy to understand and to use and did not create any problem during the implementation process. This helps the participants to concentrate on the discussion, the values, the planning, rather than on the model and its structure. The process was also a useful chance to learn more about water management, water policy and regulation and, furthermore, to listen to different opinions, ideas, information and learn more about the sub-catchment area and its environmental problems. The CATCH model was also a useful opportunity to air conflicts. Another important aspect which emerged during the implementation process is that, even though the model was not designed for conflict resolution the open dialogue promoted by CATCH may resolve potential areas of conflicts.

It is also important to point out that the search for consensus, which is an integral part of the CATCH model, did not impose undue restrictions but rather was a positive stimulus for the stakeholders, which encouraged them to cooperate and collaborate and through discussion and deliberation, almost always succeeded in arriving at a shared and common agreement.

Finally, the process helped the stakeholders to understand how it is possible to or-

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ganise and manage a participatory decision-making process and showed them that such an approach is not impossible to put into practice.

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Table 1. Example of stakeholder analysis final results (extract of the results of the stakeholder analysis session performed by the expert group).

Name of stakeholders	Power	Legitimacy	Urgency	Proximity	High scores	Classification	Level of Involvement
Autonomous Province of Trento	4,67	4,83	3,33	3,83	*4*	Definitive	*co-working*
Environmental Protection Agency of the Province of Trento	3,17	4,67	3,67	3,83	*4*	Definitive	*co-working*
Municipality of Pergine Valsugana	3,83	4,33	3,67	4,50	*4*	Definitive	*co-working*
Provincial federation of Irrigation Consortia	3,50	4,33	3,67	4,50	*4*	Definitive	*co-working*
Hotel Keepers and Tourist Entrepreneurs Association of the Province of Trento	2,67	2,67	3,00	3,67	*2*	Expectant	*co-thinking*
Italian Farmers Confederation – seat of the Province of Trento	2,33	3,67	3,33	3,00	*3*	Expectant	*co-thinking*
Sant'Orsola Fruit Growers Cooperative	4,17	4,50	3,67	4,67	*4*	Definitive	*co-working*
Industrialists Association of the Province of Trento di Trento	3,83	3,17	3,17	3,17	*4*	Definitive	*co-working*
Trouts Breeders Association	1,50	2,50	1,67	3,00	*1*	Latent	*co-knowing*
WWF Italia – Trentino	1,83	3,67	3,83	3,67	*3*	Expectant	*co-thinking*
Greenpeace Italia – Trentino	1,00	2,83	2,00	1,50	*0*	Latent	*co-knowing*
Canzolino Madrano Fishermen Association	1,67	2,67	2,17	4,67	*1*	Latent	*co-knowing*
Fersina and Alto Brenta Fishermen Association	3,17	4,00	3,83	5,00	*4*	Definitive	*co-working*

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Table 2. Cross effect of positive changes in socio-economic-environmental variables. Results of the 2nd workshop of the 1st round
(+ = positive effect; – = negative effect; 0 = insignificant effect; +/– = indeterminate effect)

Positive change (increase, improvement)	Domestic use	Agricultural use	Tourist and recreational use	Fruit processing use	Biodiversity	Springs vulnerability	Availability of water
Domestic use	■	0	0	0	–	0	–
Agricultural use	0	■	–	0	–	0	–
Tourist and recreational use	0	0	■	0	–	–	0
Fruit processing use	0	0	0	■	0	0	0
Biodiversity	0	0	+	0	■	+/–	0
Springs vulnerability	0	0	+	0	+	■	0
Availability of water	+	+	+	0	+	+/–	■

Table 3. Cross effect of negative changes in socio-economic-environmental variables. Results of the 2nd workshop of the 1st round
(+ = positive effect; – = negative effect; 0 = insignificant effect; +/– = indeterminate effect)

Negative change (decrease, worsening)	Domestic use	Agricultural use	Tourist and recreational use	Fruits working processing use	Biodiversity	Springs vulnerability	Availability of water
Domestic use	■	+	+	0	+	0	+
Agricultural use	0	■	+	0	+	0	+
Tourist and recreational use	0	+/–	■	0	+	+	0
Fruits working processing use	0	0	0	■	0	0	0
Biodiversity	0	0	–	0	■	+/–	0
Springs vulnerability	–	0	–	0	–	■	0
Availability of water	–	–	–	0	–	+/–	■

Table 4. Effect of measures on socio-economic-environmental variables. Results of the 3rd workshop of the 1st round
(+ = positive effect; – = negative effect; 0 = insignificant effect; +/– = indeterminate effect)

Parameters / Measures	Domestic use	Agricultural use	Tourist and recreational use	Biodiversity	Springs vulnerability	Availability of water
Awareness of citizens	+	+	+/–	+	0	+
Incentives to improve technology	+	+	0	+	0	+
A new pricing policy	–	–	0	0	0	+
Reduction of losses	+	+	0	0	0	+
Creation of a basin water delivery network	+	0	0	0	0	+
Installation of turbines	+	0	0	0	0	+
Traffic reduction	0	0	+	+	+	0
Improvements in scientific research and technology	+	0	+	+	+	0
Extension of the tourist season	+	0	+	+	0	+
Limits and restrictions on urban and industrial expansion	+	0	+	+	+	+

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Table 5. Cross effect of positive changes in socio-economic-environmental variables. Results of the 2nd workshop of the 2nd round
(+ = positive effect; - = negative effect; 0 = insignificant effect; +/- = indeterminate effect)

Positive change (increase, improvement)	Purification	Water quality	Tourists pressure	Residents pressure	Economic and productive activities	Landscape and recreational value	Flow of rivers	Permeability of the soil
Purification	■	+	0	0	+/–	+	0	0
Water quality	+	■	+	+	0	+	0	0
Tourists pressure	–	–	■	–	0	+/–	0	0
Residents pressure	–	–	–	■	0	+/–	0	0
Economic and productive activities	0	+/–	0	0	■	+/–	–	0
Landscape and recreational value	0	0	+	+	+/–		0	0
Flow of rivers	+	+	+	0	0	+	■	0
Permeability of the soil	0	+	0	0	0	+	–	■

Table 6. Cross effect of negative changes in socio-economic-environmental variables. Results of the 2nd workshop of the 2nd round
(+ = positive effect; – = negative effect; 0 = insignificant effect; +/– = indeterminate effect)

Negative change (increase, improvement)	Purification	Water quality	Tourists pressure	Residents pressure	Economic and productive activities	Landscape and recreational value	Flow of rivers	Permeability of the soil
Purification	■	–	–	0	0	–	0	0
Water quality	–	■	–	0	0	–	0	0
Tourists pressure	+	+	■	0	0	0	0	0
Residents pressure	+	+	0	■	0	0	0	0
Economic and productive activities	+	+	0	0	■	+/–	+	0
Landscape and recreational value	0	0	–	+/–	0	■	0	0
Flow of rivers	–	–	0	0	–	–	■	0
Permeability of the soil	–	–	0	0	0	–	+	■

Table 7. Effect of measures on socio-economic-environmental variables. Results of the 3rd workshop of the 2nd round
(+ = positive effect; – = negative effect; 0 = insignificant effect; +/– = indeterminate effect)

Parameters / Measures	Purification	Water quality	Tourists pressure	Residents pressure	Economic and productive activities	Landscape and recreational value	Flow of rivers	Permeability of the soil
Maintenance of a good waste collection	0	+	+/–	0	0	+	0	0
Improvements in the water treatment system	+	+	0	0	0	+	0	0
Monitoring in the water availability	0	0	+/–	+/–	+/–	+/–	+/–	0
Improvements in the irrigation system	0	0	0	0	–	0	+	0
Tourists and residents information	+	+	–	–	–	+	+	+/–
Restoration of artificial soils	+	+	+	0	0	+	+/–	+
Control of the rain water	–	+	0	0	0	+/–	0	0
Protection of wetlands	+	+	+	0	0	+	0	0
Promotion of research	+/–	+/–	+/–	+/–	+/–	+/–	+/–	+/–

Fig. 1. Map of Trentino, a northern Italian province and of Alta Valsugana, an alpine valley of Trentino (Source: http://www.trentinointavola.it).

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Analysis of a public participation process

P. S. Lupo Stanghellini and D. Collentine

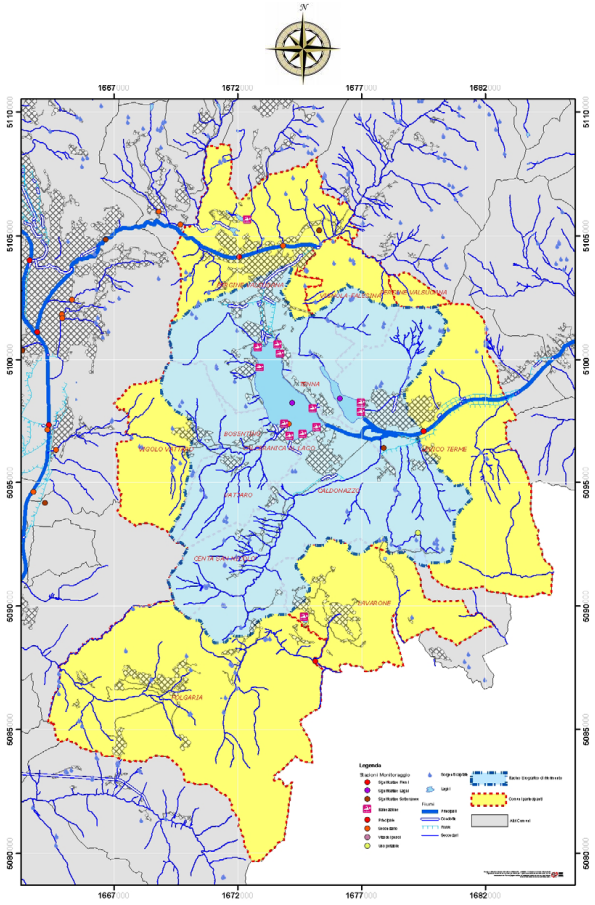

Fig. 2. Map of the sub-catchment in Alta Valsugana chosen for the study (Source: Division of Information and Environment Quality of the Environmental Protection Agency of the Autonomous Province of Trento, 2006).

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