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# Cost-Benefit analysis and multi-criteria analysis for the evaluation of natural resources: Comparision from a participative and deliberative approach

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# COST-BENEFIT ANALYSIS AND MULTI-CRITERIA ANALYSIS FOR THE EVALUATION OF NATURAL RESOURCES: COMPARISION FROM A PARTICIPATIVE AND DELIBERATIVE APPROACH

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**Abstract**

The paper deals with some theoretical considerations including deliberative position and contrasting it with other approaches. Comparing methodologies commonly used for the evaluation of natural resources alternatives, Cost-Benefit and Multi Criteria Analysis, both of them are possibly a participatory-deliberative exercises, but they are extremely different frameworks, and both of them have advantages and limitations in the evaluation of natural resources. Of course, the choice between approaches depends on the preferences of the researcher, objectives of the study and context. Further research is needed in order to provide information in practice about the application of deliberative methodologies and their results, especially for Latin America.

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# Análisis Costo-Beneficio y Multi-Criterio para la evaluación de los recursos naturales: comparación desde un enfoque participativo y deliberativo


## RESUMEN

La valoración ambiental es una herramienta analítica utilizada por los tomadores de decisiones con la intención de comparar las ventajas y desventajas de diferentes escenarios con respecto a los recursos naturales. Debido a que las opciones que se hacen en economía ambiental son difíciles de comparar se han desarrollado diversas metodologías y técnicas para la valoración ambiental. Tanto en valoración ambiental, como en otras áreas de estudio, existe una distinción entre los enfoques participativos-deliberativos y los enfoques más centralizados del tipo "arriba hacia abajo". Pero, ¿son realmente los enfoques participativos-deliberativos los mejores medios para la valoración de los recursos naturales locales?. Para lidiar con esta pregunta en este documento se presenta una comparación de dos metodologías comúnmente usadas para la evaluación de los recursos naturales: Análisis de Costo-Beneficio y Análisis Multi-Criterio, este último especialmente entendido como participativo-deliberativo, si bien puede ser y ha sido usado con un enfoque de arriba hacia abajo.


## Valoración ambiental y participación: algunas notas teóricas

Desde el punto de vista ético-filosófico, una acción que afecta la naturaleza puede ser abordada desde diferentes enfoques: utilitario, deontológico o deliberativo. El utilitarismo es una filosofía consecuentalista en la cual el valor moral de una acción solamente es determinado por las consecuencias o los productos de esta acción (Perman, 2003). En este sentido, no existe un acto malo por sí mismo, lo que es relevante es el valor que resulta del balance de los aspectos positivos (beneficios) y negativos (costos) (Korthals, 2004). Por el contrario, desde el punto de vista deontológico, predomina lo normativo y no existe lugar para un análisis de costo-beneficio: una acción estimada correcta debe realizarse independientemente de sus consecuencias y vice versa. Por ejemplo, los ecologistas y proponentes del mínimo de seguridad rechazan las comparaciones de costo-beneficio, argumentando que los beneficios de la protección no se pueden capturar adecuadamente, y ambos se sustentan en medidas físicas y no monetarias de sus metas de seguridad y de sustentabilidad. Entre las dos posiciones utilitarista y deontológica se encuentra el enfoque deliberativo, el cual por un lado se fundamenta sobre la base de deberes y derechos que no son negociables y por otro lado también considera las consecuencias. Bajo este enfoque, no existe un principio absoluto y siempre hay lugar para el debate y la consulta, brindándole prioridad al derecho a la palabra (Korthals, 2004).

La deliberación requiere una cuota de participación, sin embargo, tal y como lo reconoce Meinzen (2004) existen numerosas barreras de exclusión tales como, tiempo, dinero, distancia y ubicación, tenencia de la tierra, menor nivel educativo, información, habilidad para expresarse, así como las influencias o conexiones. Todas ellas afectan el balance de poder en las plataformas participativas.

Quienes proponen el uso de métodos participativos-deliberativos expresan sus inquietudes sobre la aplicación de los métodos de arriba hacia abajo como por ejemplo ignorar el hecho de que diferentes actores valoran los mismos costos y beneficios de diferentes maneras, además otorgar

Entre las dificultades comunes que han afectado algunos estudios de valoración en América Latina y que reconocen los mismos autores se encuentran: la ausencia de datos sobre valores de no uso o de uso indirecto, la falta de análisis sobre la distribución desigual de los impactos ambientales en la población y la existencia de conflictos de intereses complejos.

Es de reconocer que en la práctica el CBA tiene importantes ventajas prácticas (en términos de tiempo y dinero), así como de fácil interpretación por los tomadores de decisiones. Los precios de mercado a menudo brindan una primera aproximación necesaria para tomar decisiones rápidas. En cambio, los métodos más participativos y deliberativos son más complicados y requieren mayor tiempo y dinero. El problema con el uso de métodos no participativos es que normalmente se imponen compromisos en la comunidad para hacer ciertas cosas, aun cuando ellos no han sido involucrados en el proyecto. De este modo, el CBA como herramienta de arriba hacia abajo tiene sus limitaciones, por ejemplo la perdida de cooperación entre los actores involucrados y haciendo que el manejo de los recursos sea más difícil e insostenible.

En algunos casos, las herramientas deliberativas tienen otras limitaciones, por ejemplo en los grupos focales a escala local, especialmente en comunidades pequeñas, algunas personas no están dispuestas a decir en público lo que realmente piensan ya que temen por las consecuencias que tendrá en su vida cotidiana. Por ello, en estos casos los cuestionarios anónimos y las entrevistas personales son parte esencial de un proceso participativo.

Las técnicas participativas son herramientas para mejorar el conocimiento de un problema actual y no para recibir insumos que sean usados sin criticar en el proceso de evaluación, por tanto, la participación social no implica falta de responsabilidad por parte del investigador (Munda, 2002). Además, es importante resaltar que no importa cuan participativo pueda ser un enfoque dentro de una localidad, existen muchos otros factores que pueden impactar el manejo de los recursos naturales locales. Si faltan regulaciones de las actividades económicas que se llevan a cabo, si los gobiernos hacen políticas que no consideren las necesidades y preocupaciones locales o si no hacen políticas del todo, entonces el involucramiento y los compromisos locales serán débiles o imposibles (FAO, 2003).

Los ACB y MCA son métodos complementarios más que excluyentes y ambos presentan ventajas y limitaciones. La elección entre uno u otro depende de las preferencias del investigador, los objetivos del estudio y el contexto. Futuras investigaciones se requieren con el objeto de proveer información para Latinoamérica sobre la aplicación de métodos participativos y sistematizar sus resultados.

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## 1 Introduction

During the past three decades the natural wealth of the earth forest, freshwater ecosystems, oceans and coast declined by 33%. According to FAO (2003), currently 58% of the world coral reefs and 34% of all fish species are at risk. Water shortages will be faced by 35% of the world's projected population in the next 25 years, whilst human population is expected to increase in developing countries.

Even when the major environmental and food security problems depend significantly on action from the wealthy and most industrialized countries, day to day survival of many people in developing countries depends increasingly on the careful local management of natural resources. Decision making around the local natural resources management has to face up increasing number of constraints, some of them ecological, technical, or socioeconomic. In this context, participatory approaches can play an important role, facilitating the dialogue among stakeholders and strengthen the weakest users; without forgetting that finding ways to sustainably and equitably manage these resources will require dialogue and compromise not only at local but national and global levels.

Environmental evaluation is an analytical tool for decision-making intended to compare the advantages and disadvantages of certain scenarios concerning natural resources. Because the choices to be made in environmental economics are hard to compare a variety of methodologies and techniques have been developed. In environmental valuation for decision-making, as well as in other study areas, there could be distinction between the more participatory and deliberative approaches and the more centralized top-down ones. But which one

is the best approach for the evaluation of local natural resources and in what way it is incorporated by different methodologies? To deal with this issue, this paper focuses on the comparison of two specific methodologies used in the evaluation of natural resources: Cost Benefit Analysis and Multi Criteria Analysis. The Multi Criteria Analysis is especially understood to be more participatory and possibly deliberative approach, although it can, and is used as top-down approach. These aspects will be encompassed later on.

The structure of the paper includes, besides the introduction, a second part, that provides information about some theoretical point of view. The third part presents practical characteristics of the methodologies from different perspectives. Subsequently, the fourth part illustrate the above mentioned concepts with some real world case studies from Latin America. Finally, some conclusions are given.

## 2. Environmental evaluation and participatory-deliberative approaches: some theoretical notes

According to Lette and de Boo (2002) a value is the worth of a product or service to an individual or a like-minded group in a given context[1]. From a traditional point of view values perceived by different stakeholders (in a negative or positive sense) can be added up[2] with the intention to compare the advantages and disadvantages of certain scenarios. Subsequently, decision-making means making choices between alternatives on the basis of the values attached to those alternatives. Some stakeholders will perceive negative values and others positive ones in relation to the alternatives.

The most used common denominator for expressing the various different values is in monetary terms. In the case of the natural resources, the value depends not only on the market prices of its direct uses; but also on other indirect uses[3] that cannot be traded on some kind of market (see Appendix 1).

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[1] In this sense values are anthropocentric by nature, they are human oriented and human assigned.
[2] According to the functions of nature, the different types of values can be categorized from the use value to the non-use value, and they intended to be added in order to provide a total economic value (see Appendix 1).
[3] Direct use refers to goods and services derived from nature that can be consumed or used and indirect use refers to ecological functions for the subsistence of the system, which can affect use value.

There are functions of nature that are easy to quantify in monetary terms, that is production functions; but there are others such as the ecological functions and spiritual enjoyment, which are difficult to quantify.

From a philosophical ethical position, an action affecting nature could be tackled by different approaches: utilitarian, deontological or deliberative. Utilitarianism is a consequentialist philosophy which the moral worth of an action is determined solely by consequences or outcomes of the action (Perman, 2003). In this sense there is no wrong act and the value is relevantly balancing the positive (benefits) and the negative (cost) aspects (Korthals, 2004). From the opposite point of view, under deontological positions, the normative predominates and there is no place for cost-benefit analysis: an action should be done, irrespective of the consequences as long as that action is deemed to be right, and vice versa. For example, safety and ecologicals proponents reject cost-benefit comparisons, arguing that the benefits of protection cannot be adequately captured, and both groups therefore rely on physical, not monetary, measures of their underlying goals of safety and sustainability[4].

The deliberative approach share characteristis from both utilitarian and deontological positions. On one hand, it is founded on the basis of rights and duties that are not negotiable, but on the other hand it also looks at the consequences. There is no absolute principle, there is a place for debate and consultation bringing first the right to voice (Korthals, 2004).

Holmes and Scoones (2000) define deliberation as careful consideration or the discussion of reasons for and against. Therefore, as the authors point out, inclusive deliberation has been described as the only analytically rigorous way of framing analysis because it involves getting information and perceptions from as many different sources as possible and considering this information as an open, fair and equal way. In this paper, this inclusive deliberation framework is called in a more general way participatory-deliberative approach (PDA)[5], and makes

[4] According to Perman (2003) sustainability is defined as insuring a non-declining standard of living of a typical member for a future generation.

[5] Holmes and Scoones (2000) refer to this approach as Deliberative Inclusionary Process (DIP) and their focus is towards new forms of citizenship and democracy on the policy processes.

reference to its application especially in environmental valuation. Deliberation requires a quote of participation. Participation, as well as inclusion, is the action of involving others. Nevertheless, Meinzen (2004) recognizes some barriers of exclusion as time, money, distance and location, landowner, less education, information, ability to express and connections. All of them affect the balance of power in participatory platforms.

Interest in participatory approaches, has grown dramatically, especially for local environmental planning such as 'Local Agenda 21'[6], and also for the development of economic strategies. Given the growing range of actors, problems, challenges and the importance of trust around decision processes concerned with environmental issues, a PDA is often required. The complexity and specificity of environmental issues means that outside experts are unlikely to have answers that are relevant to local contexts (FAO, 2003).

The key inside PDA was that local community and outside "experts" had information and knowledge to share. It was assumed that outsider knew relatively little about local conditions, practices and resources, while community members often lacked technical knowledge that would help them adapt to changing social, political and natural environments. The important change was the identification of a two way approach to communication that respect the experience and knowledge of both inside and outside participants, and gave the community a voice in setting development. The direction of this communication and setting priorities determine the characteristics of this process. It could be top-down or bottom up as it is shown in the Figure 1.

[6] In 1992 the international agreed 'Agenda 21' for sustainable development was generated by the United Nations Earth Summit in Rio. Particularly the 'Local Agenda 21' supported the development of fresh and innovative methods of working with and for the community.

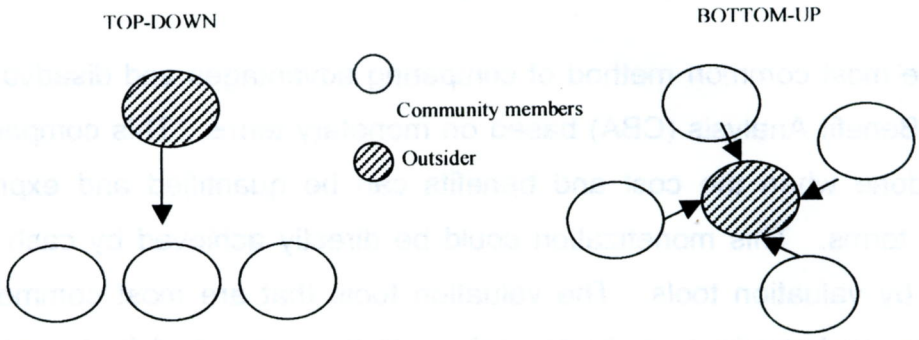


**Figure 1.** Types of two-way communication approach in participatory processes.

The analytical approach can be top down, with most of the input coming from decision-makers or the analyst. A bottom up approach focuses on analyzing information gathered from all those people with some interest or stake in the decision at hand (Fernandes, 1995).

Considering that the objective of participatory approaches is to give communities voice, then the question is what direction this process should take. Proponents of participatory-deliberative methods express some concerns about the top-down analysis, which ignores the fact that different stakeholders value the same costs and benefits in different ways, ascribing less weight to equity, livelihood and institutional issues and having lack of transparency (Rietbergen-McCracken and Abaza, 2000).

## 3. Cost-Benefit and Multi-Criteria analysis

The most common method of comparing advantages and disadvantages is the Cost Benefit Analysis (CBA) based on monetary terms. This comparison can only be done when the cost and benefits can be quantified and expressed in monetary terms. This monetization could be directly achieved by cash flows, or indirectly by valuation tools. The valuation tools that are most commonly used range from market prices or shadow prices, to the ones used for the non-market goods and service valuation like hedonic pricing method, travel cost method and contingent valuation commonly applied for non-use values[7].

Applying CBA value is important to balance the positive and the negative aspects. According to the utilitarian position under this approach everyone counts the same, if an action has good consequences and contribute to all or many people happiness then it must be done (Korthals, 2004). The objective of CBA is obtaining and providing results for comparison.

On the other hand, there will always be values, for example spiritual or intrinsic values, that cannot be expressed in monetary terms and which can therefore not be compared directly with other costs and benefits. If the future benefits of preserving our options are unknown, then it is not just hard but impossible to make decisions about preservation on benefit-cost basis (Goodstein, 1999).

Multi-Criteria Analysis (MCA) is a method that can help in dealing with this problem. This method has been developed "expressly for situations where decisions must be made, taking into consideration more than one objective, which cannot be reduced to a single dimension" (Lette and de Boo, 2002). Within the dimensions considered such as economic, social and environment, the criteria are set and the decision maker can weigh the importance of one attribute in

[7] A more detailed explanation of these techniques and their limitations in Lette and de Boo (2002). A general explanation is possible to find in any textbook on environmental economics.

association with the others, thus allowing more balanced decision making[8]. In this framework what really matters is the process since the problem structuring will determine the results (Munda, 2002).

According to Fernandes (1995) MCA techniques are many and varied, however, the procedure for addressing any problem situation is fairly standardized. The first part of MCA process, as in all valuation exercise, is the institutional analysis, which includes the problem identification, and the various stakeholders (interest groups) involved[9]. The second part is the application of the analysis itself. The order of the steps in the process could change in different applications (see Figure 2).

As is shown in Figure 2 citizens' participation is present along the process as well as the interpretation of results. In this sense, it is possible to establish that MCA is a useful tool for PDA. Munda (2002) agrees with the need of dialogue process among many stakeholders (individual and collective, formal and informal, local and not) in the management of a policy process, and that is the reason why MCA must be as participatory and as transparent as possible.

By the fact that evaluation process is highly dynamic and has a cyclic nature, alternatives or impacts may present changes. By this means, the interpretation of results in MCA due to feedback loops among the various steps and consultations among the actors.

The increasing incorporation of PDA has also led to the use of participatory techniques and methodologies. A number of participatory methods for policy decision are mentioned in literature. They include citizen's juries, panels, focus groups, issue forums, public meeting, rapid rural appraisal and participatory rural appraisal (RRA and PRA), workshops and others[10]. CBA also made use of these participatory methods but not as an example of participatory processes in the

[8] Monetary values determined and estimated by valuation techniques CBA can be incorporated within the MCA as one of the attributes, with their specific criteria to be weighted against all others.

[9] Stakeholders can be categorized by scale, but also in time, such as current stakeholders and future stakeholders. It should be noted that people as individuals may fit into more than one interest group (Lette and de Boo, 2002).

[10] For an explanation of a selection of participatory methodologies see Holmes and Scoones (2000).

sense of proposing alternatives to standard valuation tools used in economic models and are best considered as information-extraction excersises.

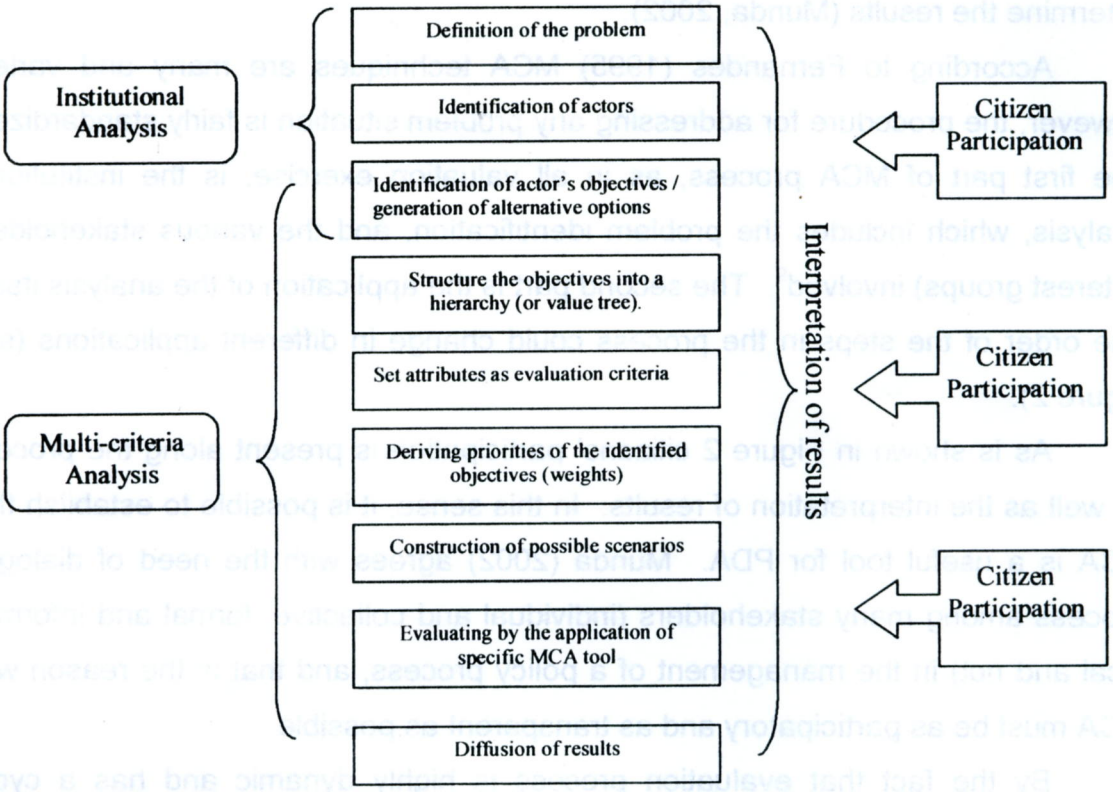


**Figure 2.** Scheme of MCA process (Source: Munda, 2002 and Fernandes, 1995 adapted)

To clarify the PDA within a process of MCA, there is one real case study focused on an interesting success story. Fernandes (1995) applied MCA exercise to evaluate the management of Saba's marine resources by the Saba Marine Park (Caribbean Sea). The general aim of the work was to assess the multi-faced value to the Saban community to provide information upon which decisions that may impact the future functioning of the park would be made. The author considers that this evaluation should reflect the degree to which the management has achieved the objectives that the people consider appropriate for the marine park. These objectives have never been made explicit. So the specific research aims were to:

1. Determine what objectives the Saban community wishes the Saba park to work towards,
2. Define feasible alternatives for the management of marine resources based on input from the community,
3. Describe possible future conditions under which the management alternatives might have to function and
4. Assess the relative value of the alternative management directions.

The analysis took a bottom up approach and the actions following the steps described in Figure 2 are described next. After having clear views of the aims of the study, the groups of interest or stakeholders were identified in early discussions with Sabans; long term residents of the island who are familiar with the park. From interviews of community residents the opinions on the desired objectives were extracted. Then the identified objectives were reviewed and validated at a public meeting and at two small group meetings. A one-page newsletter was distributed requesting further input and criticism to the identified objectives. Other groups' opinions, such as scuba divers, who were not part of Saba as Saba residents but who enjoyed the resources and also contributed to the economic benefit of local community were collected using semi-structured mailed surveys.

The objectives identified were summarized and structured into a hierarchy (or value tree) with several branches and multiple objectives within each branch. The resulting objective hierarchy was reviewed by decision-makers involved and at two small group meetings with stakeholder representatives. As part of the next step, the attributes, which provided the base upon which the objectives could be normalized and compared to each other, were established. Attributes were chosen in consultation with the decision-makers. Later on, the preferences and the relative importance of objectives at all levels were compared (prioritized).

The implementation of the previous steps enabled the definition and evaluation of the various Saba marine park management alternatives. Evaluation was based on how well the management alternatives fulfill the objectives the community

desired for the future management of their marine resources under particular future scenarios. The analytical technique chosen by Fernades (1995) for the evaluation of the alternatives was the Analytic Hierachy Process, which better adjusted to the situation. This is a formal decision analysis technique, which provides decision support by combining judgment and personal values in a logical way. According with the author, the process requires organization of objectives within a hierarchy and pairwise comparisons of objectives on a nine point scale to derive priorities among objectives (Step 4 and 6 Figure 2)[11]. Subsequently, the relative value applied over alternative management was based upon the degree of achievement of the community defined and prioritized objectives of Saba Marine Park.

The actions, regulations and results of any chosen management regime would take time. For this reason the evaluation of scenarios was conducted based on a 5-year lapse.

Thus the evaluation combines the objectives identified by the community, stakeholder priorities for those objectives, management alternatives and scenarios considering the lapse of time. Certainly, economic benefits of management were desirable, but the study incorporates all the benefits Sabans wanted: economic, environmental, social, etc. On the whole, there was a tendency to give higher priority to maintaining the ecological balance of the marine environment.

The results together with the suggestions provided by the community can be, and are being used by Saba Marine Park to increase their multi-dimensional value to the island. They can adopt local people's recommendations which require no legislative change and which lie within feasible logistical and financial constraints, for example greater marine education at the schools. This should provide a basis of support to the park as it moves toward meeting the community needs and desires.

Some limitations considered by the author are firstly the difficulty to have a truly representative sample of the community. Secondly, the analysis is based upon preferences and opinions at one point in time; as participants acquire more

[11] Preferences are the information upon which ratio scaled priorities for objectives are generated by the Analytic Hierarchy Process.

information and reconsider perspectives their opinions can change as well as their behavior. Thirdly, there might be a bias in the views from divers as they were sampled from the list from a conservation-oriented foundation. Fourthly, this work did not provide a mathematically optimal solution to the success achievement of the community identified objectives. Optimal solution lies in further analysis using optimization techniques or considering judgement over the suggested management action based selection of those most able to achieve the community designated objectives of Saba Marine Park.

Table 1 resumes some characteristics of CBA and MCA under different perspectives.

Table 1. Comparison of methodologies under different perspectives

| Perspective | Approaches | |
|---|---|---|
| | CBA | MCA |
| Ethical position | Utilitarianism | Deliberative |
| What really matters | Results | Process itself |
| Expression of values | One criteria: quantitative economic value | Multi-criteria: quantitative and qualitative environmental, social and economic value |
| Valuation techniques / data collection | Mitigation, travel and damage cost, lost of production, expenditures and revenues, etc – use value<br>Contingent Valuation – non-use value<br>/ cash flows, surveys, focus group | Analytic Hierarchy Process, NAIADE, etc.<br>/surveys, PRA, PPA, citizen juries, etc |
| Communication (direction) | Top-down | Top-down or bottom-up |
| Advantages | Practical advantages (time, money, easy interpretation) | Transparency |
| Better deal with | Small uncertainty and stake | Uncertainty and value conflict |

Is important to remind that any model is a simplification of reality and resulting from assumptions made. According to Munda (2002), what really matters is the process since the problem structuring will determine the result. "MCA accomplishes goals of being inter/multi-disciplinary (with respect to the research team), participatory (with respect to the local community) and transparent (since all criteria are presented in their original form without any transformations in money, energy or whatever common measurement rod)" (Munda, 2002, p12).

MCA is a broader method and provide a more participatory-deliberative framework than CBA. But does it mean that MCA is better methodology? There is nothing like a best methodology all of them present advantages and disadvantages. It is important to remark that the choice between methods depends on many factors, one of them present at first is the preferences of the researcher. To extend about this, next section brings some lessons with advantages and limitations of applying these methodologies in specific contexts from Latin America.

## 4. Latin America case studies: experiences and lessons

This section is based on the illustration of some exercise of evaluation of natural resources applied over different localities and resources from Latin America. Most of the cases applied CBA as evaluation method and in general the quantification was made using valuation techniques such as contingent valuation method (CVM) and travel cost methodology. In all cases, data collection from primary sources were made using surveys and just in few cases were combined with participatory tools such as focus group and meetings. (See Appendix 2).

Common difficulties have affected some valuation studies in Latin America using CBA. From the compilation of cases edited by Rietbergen-McCracken and Abaza, (2000), difficulties can be summarized in: absence of data about indirect uses and non-use values, lack of analysis about different distribution of environmental impacts on population and complex conflict of interest.

As an illustration, the case of *Héroes y Mártires* mangrove (Nicaragua) embodies all the difficulties identified. Because of the location of mangrove, the complex interaction zone (different agencies over jurisdiction, different users interest), the provision of variety goods and ecological services and the complexity of the socio-economic situation; CBA as decision tool is very limited. In this case, researchers may face difficulties associated with the definition of sustainable management alternatives including other use activities outside the bounds of mangrove forest itself, with limited access to data resulting in the underestimation of the value, and with highly varying quality of individual valuation results.

In the case of estimating the household willingness to pay for water services in a village in rural southern Haiti, direct surveys of resource user may be more reliable than methodologies based on observation of market prices. Still, the use of surveys may not reflect all the positive externalities or the full savings for the households and the community of water quality, epidemiological effects and time due to the proximity to public water post. Besides, and especially in developing countries, it is necessary to consider the socioeconomic situations such as hyperinflation, unemployment or budget restrictions on very poor populations, which in turn affect the opportunity cost of time and the willingness to pay.

Complex conflict of interest may appear in multiple use resources and additional approaches as MCA are needed to integrate possible different stakeholders' preferences in efforts to gain consensus in the design of the most favorable managing option. In the case of the coral reef park in Bonaire island, top down decision making as implied by CBA might only serve to make park management more difficult by loosing, for example, the cooperation of the dive operators –actors with stake in limiting diving impacts on the reef (Rietbergen-McCracken and Abaza, 2000).

Several of the valuation approaches also depend on institutional conditions in the country as well as on recent international agreements. For example, changes in property rights regimes are the starting point for many of the study's recommendations for capturing non-timber benefits from the forest (the case of Mexico). The model used to calculate the expected value of pharmaceutical

developments based on forest biodiversity depends on national institutional capacity to negotiate royalty agreements, the existent of patent laws and local R&D facilities. Also the degree of effectiveness protection may influence the way some value components are quantified. Nevertheless, studying national and international conditions without consideration of local level management represent a weakness. First, there is no indication of how policy might be adapted to varying ecological conditions; second there is no information of possible conflicts between protection and local activities; and third it looses the emphasis on capture or internalize important indirect use values due to ecological services at the local level.

One advantage of MCA is the inclusion of values that may not be quantified using economic valuation methods, but which are highly relevant for determining social optimal policies. For example, to solve questions such as the government decision to invest in a park management, such as Bonaire or Saba marine parks, would depend only on the economic benefits from foreign visits; this meant that the study won't analyze a wider range of management policy options and scenarios. In that way, top-down decision-making for park management such as the introduction of higher park fees or other economic incentives for controlling visitation would probably be met with resistance from the tourism dependant sectors of the economy.

For the objectives or the characteristics of the study, there are other cases in which MCA will still face some limitations or disadvantages. From a technical point of view, as Fernandes (1995) pointed out in the case of Saba, MCA does not to provide one optimal solution. Various groups of interest will often assign different priorities to the respective objectives and normally it may not be possible to determine a single best solution via multi-objectives models. Some critics of MCA say that in principle, in CBA, votes expressed on the market by whole population can be taken into account. On the contrary, MCA can be based on the priorities or the preferences of some decision-makers only. Some authors consider this to imply that decision-making is ultimately arbitrary and dependent on the decision maker and his/her interpretations and norms (Lette and de Boo, 2002).

This argument had its reply, for Munda (2002) it is possible to trust in votes expressed on the market if the distribution of income is accepted as a means to allocate votes. This criticism is correct if a top-down approach is taken[12]. Whereas the author points out that in the case of MCA, it could be said that the way these decision-makers have reached their position is accepted as a way to allocate the right to express these priorities.

Likewise, as the author indicates, technically and pragmatically is very difficult to derive weights between the economical, social and environmental dimensions from participatory techniques. So that is considered desirable and important the use of weights from ethical principles (such as precautionary principle).

In fact, CBA has important practical advantages (in terms of money and time), as well as easy interpretation by decision-makers. Market prices often give the first approximation needed to take rapid decisions. If the purpose of the study is the analysis of total economic value of forest (for example in the case of Mexico), demonstrations of potential conservation value may be interpreted as a basis for a decision to develop and implement policies for rent capture. The valuation exercises imply first approximation and are used more as a means to putting forest conservation in policy agenda, rather than as a rigorous analysis of alternative policy options[13]. Sustainable yields as well as economic valuation may be taking as warning indicators that should bring stakeholders to the table.

Still, the main added value using MCA as participatory-deliberative process is the transparency it creates in decision-making and the possibility of communicating information on the nature of the problem.

As it has been shown formerly, MCA also deals with other dimensions, apart from the measurable dimension, in which power relations, hidden interests, social participation, cultural constraints and other variables that heavily, but not deterministically affect the possible outcomes of the strategies to be adopted (Munda, 2002).

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[12] Or "technocratic approach", where the analyst constructs the problem relying only upon experts' inputs. By experts means those who know the "technicalities" of a given problem.

[13] Additional approaches as MCA are needed then to integrate possible different stakeholders' preferences in efforts to gain consensus in the design of the most favorable management option.

Participatory-deliberative spaces, enabling community participation not only improve project impact and credibility but develops community skills and capacities to do similar work in the future. Local activities can play a vital role in educating, mobilizing and responding to the public to promote sustainable development.

A problem with non-participatory methods is that they often impose a commitment on the community to do certain things even though they were not involved in the project. To this end, CBA as top-down decision-making tool has limitations, for example, by loosing the cooperation of other actors involved, making resource management more difficult and unsustainable.

On the level of social understanding, there is an important role played by deliberation, which consider as very important part the construction of capacities and the capability for the pragmatic point of view, to compromise overlapping agreement and disagreement, consensus and divergence (Korthals, 2004). The objective is bringing the basis to democratise different types of stakeholders to diminishing vertical relations and clientelism (Warner, 2004). However, there remain questions about whose preferences are to be considered, who will participate at local and other levels, who will speak, what is the agenda, and how and who will implement the policy on the basis of the results[14].

In some cases participation tools have their limitations. For example, in exercises of focus groups at the local scale especially in small communities, some people were not willing to say publicly what they really thought, since they were afraid of the consequences for their everyday life (Munda, 2002). For this reason anonymous questionnaires and personal interviews are an essential part of a participatory process.

As it is stated by Munda (2002), public participation is necessary component of MCA, but not sufficient. Participation techniques are a tool for improving the knowledge of the problem at hand and not for receiving inputs to be used uncritically in the evaluation process. Social participation does not imply lack of responsibility from the researcher.

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[14] Decision-making is conditioned by many factors: stakeholders, context, personal preferences, existing institutional or administrative arrangements. Has its own instruments as election voting, but also requires the construction of a dialogue process.

It is important to notice that no matter how participatory an approach may be within a local community, there are many other factors that can impact the local management of resources. If business regulations are lacking and if governments make policies that do not take local needs and concerns into consideration –or do not make policies at all – then local involvement and commitment will be weaker or impossible (FAO, 2003).

A political affair plays an important role about PDA and particularly in the level of decision process at the local level. According to Ribot (1999), decentralization and participation can only be evaluated if two components of decentralization are in place: locally accountable representation and significant public powers over which the representatives have freedom of decision. In the absence of such representation, there is a danger that decision-making could be taken over by elite groups. In this sense, local government is an appropriate institution to be involve in decentralized natural resources management, but it must be empowered and legitimized. In the developing countries, entrusting local government often means building up or legitimating this part of the state. Natural resource management can play an important part in the transition to entrusted, locally accountable local management.

## 5. Final Remarks

Because the choices to be made in environmental economics are difficult to compare, a variety of methodologies and techniques have been developed. In many countries environmental issues are becoming worse and local capacity has to be strengthened significantly.

The first conclusion of this paper is that ACB method analysed from different perspectives it is not favorable to allow participative and deliberative approaches. The second conclusion is that MCA is possibly more open to participative deliberative approaches but not necessary as a bottom up perspective.

The third conclusion is that the choice of the best evaluation approach in a speciffic case study depends on many factors. First of all the preferences of the

researcher is a determinant factor, but also the context such as the location, the kind of natural resource, the size of the community, the power relations, the political aspects, the socio-economic and institutional conditions at local, national and international level.

The objective or focus of the study also determines which is the best approach or methodology, for example how fast information is required to bring actors to the table or when the aim is to test particular methodology. Some of these factors were evident from the revision of the Latin America case studies.

Further research is needed in order to provide information, in practice, about the application of participatory-deliberative methodologies in the valuation of natural resources and their results, especially for Latin America. This kind of research can contribute to the discussion, both regarding scientific as well as development issues around natural resource management, with particular reference to the best ways and means to achieve proper participation of stakeholders; and thereby assisting more sustainable use and management of natural resources at local level.

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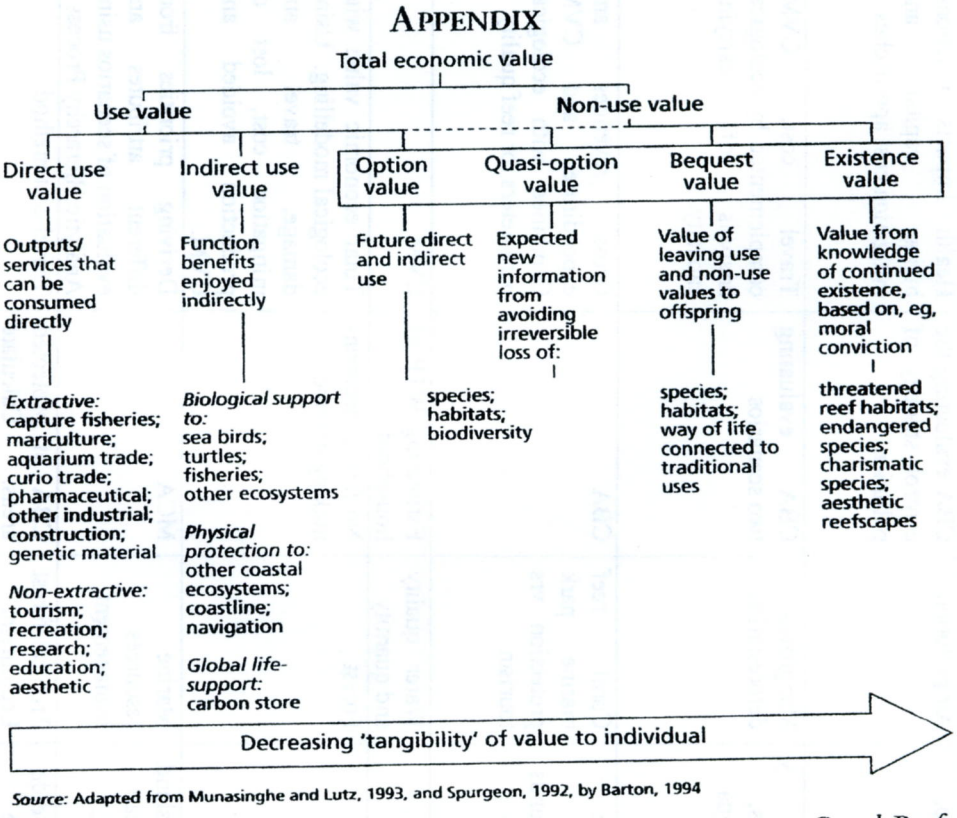
http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21chapter28.htm

**Apendix 1.** Economic values attributed to the environment




Source: Adapted from Munasinghe and Lutz, 1993, and Spurgeon, 1992, by Barton, 1994

**Figure 11.1** *Economic Values Attributed to the Environment: a Coral Reef*

**Appendix 2.** Methodological perspective. A resume of cases studies from Latin America.

| Country | Resource /problem | Methodology of evaluation | Valuation techniques | Main sources of data | Methodological limitations |
|---|---|---|---|---|---|
| Santiago, Chile | Air pollution | CBA evaluating the control strategy of pollution | Health impacts functions, human capital and mitigation cost approaches | Secondary: other studies | -underestimate the value of improve air in relation to WTP<br>-does not allow for analysis individual policy impacts<br>-environmental impacts among different income groups is not analysed |
| Héroes y Mártires, Nicaragua | Mangroves deforestation | CBA evaluating two scenarios | Travel cost, CVM, complemented by ecological analysis of carrying capacity. | Secondary: time series data and other studies<br>Primary: surveys | -absence of data on indirect uses<br>-information, aggregation and non-monetary trade-offs difficulties<br>-net present value criteria do not consider the distribution of impacts on population<br>-CBA not reveal or resolve complex conflict of interest |
| Bonaire Island, Netherlands Antilles | Coral reef marine park protection vrs tourism | CBA | Gross revenues and expenditures and CVM Combined with ecological parameters for reef quality | Primary data: surveys, and some cross-checked with tourism statistics | -no quantification of indirect non-use values<br>-no consideration of socio-economic context or resistance for decisions<br>-little attention to reef fauna<br>-limited range of management policy options and scenarios |
| Laurent, Haiti | Water quality and quantity | Estimating WTP of household | CVM | Primary: survey formats and focus groups | -time aspects were not considered<br>-WTP not reflects all positive externalities associated |
| Mexico | Forest | No formal decision-making method | Total economic value with ecological modelling. Using damage, travel and mitigation cost, lost of production avoided and CVM. | Primary: surveys and existing studies | -limited relevance for local level management<br>-timber values not included that can be designed to minimize conflicts with other benefits |
| Saba Island, Caribbean sea | Marine resources management | MCA | Deriving priorities from different attributes and evaluation of scenarios using Analytic Hierarchy Process | Primary: interviews, meetings, surveys, newsletter | -limited sampling regime<br>-just one point in time<br>-optimal solution lies in further analysis |
| Monteverde Reserve Costa Rica | Tropical forest Ecotourism | CBA of protected areas. Calculate higher entrance fee. | Travel cost method | Primary: surveys | -tourist's airfare doesn't say anything about true WTP<br>-differences in values with this tool (factors as closeness, times in the year). Why should Kenyan elephant be more valuable than Madagascar lemur? |
| Térraba-Sierpe Humid, Costa Rica | Mangrove management | Popular consultation mechanisms | Total economic value: net income estimation and CVM | Primary: surveys for economic valuation and consultation to evaluate management alternatives | - Some artisanal activities and ecological functions were not included because the absence of market or data availability. The result is a partial value approach. |

Source: Elaborated based on Gatjens et al (2004), Lette and de Boo (2002), Rietbergen-McCracken and Abaza (2000), and Fernandes (1995).