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## Conference Paper

# Q methodology to define policy issues and promote stakeholder dialogue in Praia da Vitória Bay in Terceira, Azores

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**Q methodology to define policy issues and promote stakeholder dialogue in  
Praia da Vitória Bay in Terceira, Azores**

**WORKING PAPER**

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When dealing with complex issues commonly found in Coastal Zones, there is a need to find an efficient assessment strategy of processes and their causes, as well as a method which could effectively promote a dialogue with the stakeholder affected by these processes. This dialogue is an essential part of problem structuring routine since it allows mutual learning by generating and evaluating divergent knowledge claims and viewpoints. Problem structuring can start from a broad subject that is refined until the definition of a policy issue which requires a deeper analysis of its cause, as well, as possible alternatives of action. We explore the use of Q methodology as a tool for problem structuring and policy issue definition. In addition, Q methodology can be suitable for a first evaluation of the system in analysis while uncovering the several perspectives of stakeholders. We applied this methodology in Praia da Vitória Coastal System located in Terceira Island, in Azores Archipelago. The method has been applied in its original format as a method of identifying stakeholders discourse. Additionally we modified it and use it in group discussions aiming at promoting stakeholder dialogues. Results obtained show that Q methodology is an adequate to understand the value and interest of stakeholders, while adding useful information for stakeholder selection in stakeholder dialogues. The use of the method in its original format and in group session also allowed a reflection concerning the challenge of designing and promoting dialogue processes.

## **1. Introduction**

When dealing with complex issues commonly found in Coastal Zones, there is a need to find an efficient assessment strategy of processes and their causes, as well as a method which could effectively promote a dialogue with the stakeholder affected by these processes. These characteristics are common in distinct regulation documents (E.C., 2005; E.C., 2008; EC, 1999) and scientific work (Cuppen et al., 2010; Guimarães, 2010 ; Marjolein and Rijkens-Klomp, 2002). Complex ecological and environmental problems are characterized by (scientific) uncertainties, and a diversity of (conflicting) values at stake (Cuppen et al., 2010). Environmental problems are mainly occurring in the public arena which explains the diversity of values, perspectives, powers and interest. Ignoring this fact and trying to deal with this issue taking into account only part of the stakeholders has proven to bring more cost than benefit (Guimarães et al., submitted; Martinez-Alier et al., 2010; Ostrom and Cox, 2010; Videira et al., 2009). Stakeholders can be defined as actors involved in a determined issue by influencing, being influenced, by having knowledge, expertise or experience on it. This broad definition embarrasses different categories of stakeholders from academia, government, policy makers, business, users and Non Governmental Organizations (NGO). . In order to produce effective decision making there is a need to articulate distinct perspectives during a decision making process. There are several methods and techniques to promote stakeholders discussion (Eftec, 2006). The selection of the adequate methods depends on the required goals, budget and time.

The assessment of processes and their causes in natural resource management is increasingly performed using Decision Support Systems (DSS). DSS in this field is a wide research area where usefulness of this effort is frequently questioned (de Kok and Booi, 2009; Goosen et al., 2007; Hamouda et al., 2009; Kallis et al., 2006; Pearce et al., 2006; Westmacott, 2001). Participation in the process of creating a decision support system is defended by us and other authors as a form of assuring the final product becomes a useful tool (Costanza and Ruth, 1998). The first step to create a DSS is to understand what will be the issue, hence, we need to perform problem structuring (Hisschemoller, 2005). Problem structuring implies the clear identification of the policy issue that should be analyzed. This article focuses on a practical application of policy issue definition towards the construction of a DSS in Praia da Vitória Bay, Terceira Island located in Azores archipelago. To achieve this goal we use Q methodology. The method is used to

explore as a form of stakeholder's identification and detection of consensus/disagreement between them. In its regular form, Q methodology promotes stakeholders interaction in a passive form, since at a certain point of its application participants have to choose between discourses of distinct stakeholders, in term of agreement and disagreement. However, we go a step further and analyze the difference between this passive interaction and the active interaction. We mix discussion groups with Q sorting exercise and extend our discussion toward structured stakeholders dialogues, benefits and difficulties.

### **1.1. Praia da Vitória Bay, Terceira island, Azores archipelago**

The Azorean archipelago is located in the North Atlantic Ocean between 37-40° N latitude and 23–31° W longitude (Fig. 1) and the closest point to mainland Europe is around 1,400 km (Aranda, Gabriel et al. 2010). It is composed of nine volcanic islands of relatively recent origin (varying between 0.25 and 8 Myr, although most areas are less than 1 Myr old). Terceira is the third largest island, with c. 402 km<sup>2</sup> and a maximum altitude of 1,021 m. The climate is temperate oceanic, characterized by mild temperatures, moderate to high rainfall, and high atmospheric humidity (Azevedo 1996). The Azores were uninhabited until colonized by the Portuguese in the 15th Century. Man has exploited littoral, near shore and offshore living resources since the earliest colonization (Serpa 1886; Sampaio 1904). In recent years pressures on littoral and offshore resources have grown (Santos, Hawkins et al. 1995) with the subsistence or artisanal exploitation to more commercial operations.

The coast line of Terceira Island is characterized by cliffs that vary from small to moderate heights interrupted by small bays, above all through east and south sides (fig. 1). The northern coast is constantly submitted to the wave action, and on the other hand, the eastern part is protected from these actions (Morton, Britton et al. 1998 ). This way it was possible to emerge a wetland that attracted many kind of sea birds exclusive from this place, and form a long beach with 3 kilometers length; unique in Azores, and with a dune field of 13 meters width. In our days this wetland is reduce to a small fraction. Human activities mainly related with construction have drained the wetland and the habitat disappeared some decades ago as well as the beach, only remaining a small strip of sand. In recent year political will as emerge and investment haven been done to recover part of this natural habitat.



**Figure 1:** Geographic location of Azores, Terceira Island and Praia da Vitoria city.

## 2. Q Methodology application

Q methodology has been developed by the psychologist William Stephenson in 1930 becoming a reference to study people's subjectivity (e.g. (Stephenson 1935)). The first application were performed in psychology, but it's used has spread to various fields of social science (Dryzek 1990; Addams and Proops 2000; Guimarães 2010).

The most important advantage of this method is the possibility of understanding both the identities and desires of the local stakeholders in the terms and categories they themselves are using, and not making preliminary assumptions about groups having or not having a legitimate stake and any related conflicts (Clayton 2001).

While in R methodology (surveys and questionnaires) respondents are asked to express views in isolated statements, with Q methodology each respondents view of a statement takes into account all the presented statements (Cuppen, Breukers et al. 2010). Another important difference between "Q" and "R" methodology is the representation and sampling. While with "R" methodology we want to analyse the level of support for those perspective along the population, which implies a random sampling, with Q method the importance is in the variety of perspectives found, which implies that the fact that a person is assumed to have a different point of view is enough reason to include him in the sample. For these reason we need a representative sampling in "R" methodology, while in "Q" methodology relies in a purposive sampling which is smaller.

Using Q methodology in system design seems adequate since the researcher loses the exclusive power to signify the reality of the researched (Robbins and Krueger 2000; Cuppen, Breukers et al. 2010) at the same time he is bringing stakeholders into the process. In addition, it can work with specific stakeholders without the need to use the population so a valid sample is obtained.

This method can be divided in 5 steps: interviews, Q statement selection; Q sorting questionnaires, data analysis using factor analysis, identification and description of each factor commonly referred as perspectives. In the first step around 40 interviews were performed. The interviews were performed in September 2009. Each interview lasted from 45 to 90 minutes. Stakeholder's institutions (table 1) were selected using as a guideline the key areas of human activities occurring coastal system of Praia da Vitória Municipality (Glassner 1993; Smith 2001). With each stakeholder institution, participants (table 1) were selected taking in account his competence. In addition we used snowball sampling (Goodman 1961; Heckathorn 2002; Salganik and Heckathorn 2004), by asking each participant to mention someone which they consider relevant or and with a critical opinion about the evolution of the coastline in Praia da Vitória Municipality.

**Table 1:** Stakeholder mapping of Praia da Vitoria Coastal System.

| Human activities                     | Institution   | Nature of affiliation | Participants  | Nº |
|--------------------------------------|---|-----------------------|---|----|
| Navigation and Coastal engineering   | Administração dos Portos da Terceira e Graciosa (APTG)                | Public Body           | Luís Dutra  | 1  |
|                                      | Capitão do Porto da Terceira  | Public Body           | José Ribeiro Pinto  | 1  |
| Conservation                         | Sociedade de Espeleologia "Os Montanheiros"                           | Civil Society         | Paulo Barcelos; Pardal  | 2  |
|                                      | Gê Questa   | Civil Society         | Orlando Guerreiro   | 1  |
|                                      | Ecoteca   | Public Body           | Not available   | 0  |
|                                      | Projecto de recuperação do Paul, Câmara Municipal da Praia da Vitória | Public Body           | Elisabete Rodrigues; Madailda                                     | 2  |
| Strategy                             | Comando Aéreo dos Açores  | Public Body           | Coronel Luís Ruivo  | 1  |
| Archaeology and Cultural Heritage    | Museu de Angra do Heroísmo  | Public Body           | Maduro Dias   | 1  |
| Living Resources                     | Sindicato dos Pescadores da Ilha Terceira                             | Civil Society         | Paulo Borges  | 1  |
|                                      | Associação das Mulheres de Pescadores e Armadores da Ilha Terceira    | Civil Society         | Gloria Brasil; Isabel Cardoso                                     | 2  |
|                                      | Subsecretário Regional das Pescas                                     | Public Body           | Marcelo Pamplona  | 1  |
|                                      | Associação Terceirense de Armadores                                   | Civil Society         | Floriberto Cardoso  | 1  |
| Waste Disposal and Pollution Control | Associação Humanitária dos Bombeiros Voluntários da Praia da Vitória  | Civil Society         | Luís Vasco; João Cunha  | 2  |
|                                      | GNR - Guarda Nacional Republicana (Gabinete de Ambiente)              | Public Body           | Carlos Lopes; Helder Palhinha                                     | 2  |
|                                      | Policia Marítima  | Public Body           | Subchefe Marques  | 1  |
|                                      | Praia Ambiente  | Private - Public body | Cota Rodrigues  | 1  |
|                                      | Secretaria Regional do Ambiente e do Mar                              | Public Body           | José Meneses; Maria Conceição; Elisabete Santos; João Pettencourt | 4  |
|                                      | Inspecção Regional do Ambiente  | Public Body           | Francisco Vaz de Medeiros; Ulisses                                | 2  |
| Leisure and Recreation               | Clube Naval da Praia da Vitória                                       | Civil Society         | Ricardo Toste   | 1  |
|                                      | Observação de Cetáceos  | Private Sector        | Carlos Lima   | 1  |
|                                      | Actividades Subaquáticas  | Private Sector        | Alexandre   | 1  |
|                                      | Associação de Surf da Ilha Terceira                                   | Civil Society         | Carlos Leal   | 1  |
|                                      | Instituto de Socorros a Náufragos (ISN)                               | Public Body           | Not available   | 0  |
|                                      | Marina da Praia da Vitoria  | Public Body           | Paulo Nunes   | 1  |

|                                   |  |                |  |    |
|-----------------------------------|--|----------------|--|----|
| <b>Education and Research</b>     | Centro de Investigação e Tecnologias Agrárias dos Açores (CITA_A)      | Public Body    | Paulo Borges; Rosalina Gabriel; Nídia Homem; Filipe Barata | 4  |
|                                   | Departamento de Ciências Agrárias da Universidade dos Açores           | Public Body    | João Pedro Barreiros                                       | 1  |
|                                   | Laboratório de Ambiente Marinho e Tecnologia - Universidade dos Açores | Public Body    | Manuela Juliano; André Azevedo                             | 2  |
|                                   | SPEA - Sociedade Portuguesa de Estudo das Aves                         | Civil Society  | Carlos Pereira   | 1  |
|                                   | Gabinete de Ecologia Vegetal e Aplicada (GEVA)                         | Public Body    | Eduardo Dias; Cecilia Melo                                 | 2  |
| <b>Settlement</b>                 | Câmara Municipal da Praia da Vitória                                   | Public Body    | Paulo Messias  | 1  |
|                                   | Delegação de Turismo da Terceira                                       | Public Body    | Veronika Bettencout  | 1  |
|                                   | Gabinete de Arquitectura   | Private Sector | João Monjardim   | 1  |
|                                   | Associação Regional de Turismo   | Civil Society  | José Tostes; Ana Carvalho                                  | 2  |
|                                   | Câmara do Comercio de Angra do Heroísmo                                | Public Body    | Not Available  | 0  |
| <b>Manufacturing and Services</b> | Associação para Gestão do Parque Industrial da Ilha Terceira (AGESPI)  | Civil Society  | António Rino   | 1  |
|                                   | Matadouro Industrial da Ilha Terceira                                  | Public Body    | Pedro Correia; Rui Teixeira                                | 2  |
|                                   | Residencial Teresinha  | Private Sector | Not available  | 0  |
|                                   | Agência de Viagens   | Private Sector | Not available  | 0  |
|                                   |  |                | Total  | 50 |

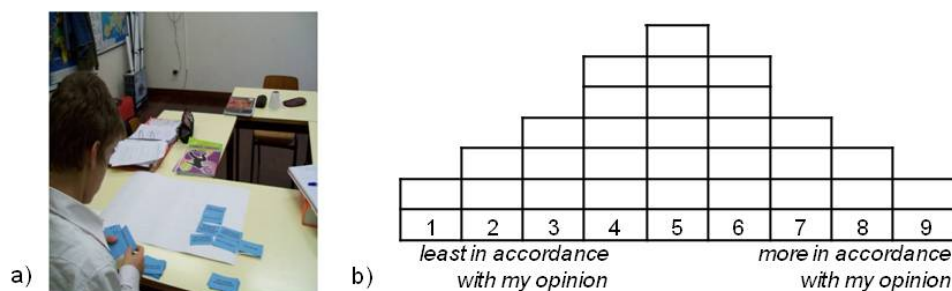
With the information driven by the interview we defined the concourse: the full range of discussion and discourse on the particular issue under study (Cuppen, Breukers et al. 2010), in our case being the main policy issue on the coastal system of Praia da Vitoria Municipality. From the obtained concourse, a set of statements are derived in the second stage of the method. This statement should express the diversity of issues identified. From a large set of statement, 28 statements were selected for the next step (table 2), taking into account the amount of times this issue was referred by stakeholders. The wording of statements was done taking into account the original wording so that stakeholders could better understand and recognize the original meaning.

**Table 2:** Q statements

| Code | Statements  | Overall theme        |
|------|---|----------------------|
| 1    | The Pedreira Paul presents a high potential. It need to be sustainably explored.  | Wetland Conservation |
| 3    | The Belo Jardim area is what remains of the old dune system. It needs to be recovered.  |                      |
| 6    | It's important to understand the impact of the fuel deposits behind the Paul da Praia.  |                      |
| 7    | It's important to understand if the Paul da Praia is going to maintain it's ecological conditions.  |                      |
| 21   | There is a need to understand if the mosquito's population around Paul da Praia will increase.  |                      |
| 26   | It would be interest to understand the cost and benefits of opening the Paul da Praia to the sea.   |                      |
| 15   | There is a need to understand if the Paul da Praia has the necessary conditions to be used by migrating and resident birds.   |                      |
| 2    | The illegal garbage deposition is a severe problem that needs to be analyzed.   | Pollution            |
| 4    | The impact of waste water runoff in the Industrial Zone is an important issue to analyze.   | Urban Development    |
| 5    | Building in the coastal area is increasing and might cause the decrease of the environmental quality  |                      |
| 10   | Porto Martins areas include species of high ecological relevance. Hence its socio-economic development needs to be controlled in order to maintain these values.        |                      |
| 12   | It would be interest to understand the cost and benefits of different locations of the Marina of Praia in relation to the local hydrodynamic and socio-economic impacts |                      |
| 16   | There is a need to understand the impact of human activities in the streams, manly in flood episodes.   |                      |
| 27   | There is a need to understand the impact of cement platforms in rocky bathing areas.  |                      |

|    |   |                           |
|----|---|---------------------------|
| 25 | The Praia da Vitoria Marina might have a negative impact on the attractiveness of the beach.  |                           |
| 8  | The identify the marine areas to protect is important, as well as the analysis of its ecological and socio-economic benefits  | Fisheries                 |
| 9  | Its important to understand how we can maintain the population of marine invertebrates (barnacles and limpets) in the Municipality.   |                           |
| 11 | There is a need to study the sustainability of the stocks of fishes taking into account its exploration strategies aiming at the highest valorization   |                           |
| 13 | The fishing sector needs to be analyzed taking in account the actual cota system and European framework   |                           |
| 18 | It's important to understand if the actual fishing gear is efficient in the sustainable exploration of local resources. However it's also necessary to understand social importance of this gear. |                           |
| 14 | There is a need to study the impact of the interventions in the coastline (e.g. jettys...) in wave formation and human activities   | Coastal engineering works |
| 19 | There is a need to study the impact of sand extraction along the bay of Praia da Vitória.   |                           |
| 20 | There is a need to study the impact of the protection strategies of the Fuel fleet. The selected strategies must take into account other uses of that area; surfing and bird watching.            |                           |
| 22 | The development of artificial reefs to protect the coastline should be analyzed in terms of cost and benefits   |                           |
| 23 | It's important to study the current patterns in Praia da Vitória to understand the evolution of the protection build.   |                           |
| 24 | It is important to study the sand movement due to currents in Praia da Vitória Bay.   |                           |
| 28 | There is a need to understand the impact of underwater invasive species.  | Invasive species          |
| 17 | The invasive species in the coastline have ecological and socio-economic impacts that need to be analyzed.  |                           |

Using these statements a questionnaire was performed to most of the individuals identified in the first stage (table1). Statements were printed on small cards (fig. 2a). Participants were asked to sort the 28 statements according to their importance. A nine-point scale was used: -4 -3 -2 -1 0 +1 +2 +3 +4. Here -4 corresponded to the statement participants considered as “*least in accordance with my opinion*” and +4 the “*more in accordance with my opinion*” statement. The ranking of the statements by an individual is known as that individual’s “Q sort”, and reflects the individual’s valorization of each statement. Participants are forced to make choices because the number of statements in each of the seven-point scale was defined previously, so the final result is always a normal distribution of the data. The number of statements that had to correspond to each element of the scale is described in figure 2b. During the Q sort an interview was undertaken to better understand the participant’s choices.



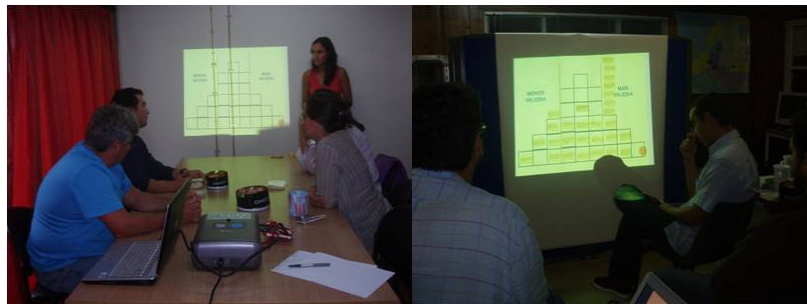
**Figure 2:** a) Q sort distribution, b) Q sort scheme.

Thirty three Q sorts were performed. Delineating the various discourses within the concourse was accomplished by factor analysis of the Q-sorts. The analysis was done using PQ method version 2.11 (Schmolck 2002), a freeware program devoted to Q



analysis. One enters each Q sort in study as data and the package then correlates each Q sort with every other sort. This intercorrelation matrix is then factor analyzed using a Principal Components Stakeholders Analysis.

The Q sort questionnaires were applied to each participant and also in group discussions (fig.3). In each meeting 3 to 5 stakeholders of different backgrounds were present and after a short presentation of SAF approach, the participants had to place each statement in a hierarchical order by discussing and finding a consensual decision where to locate each sort. This data was analyzed using cluster analysis. Cluster analysis was done using Squared Euclidean distance measure and single cluster method.



**Figure 3:** Q sorting in group sections.

Each factor is usually analyzed taking into account the highest and lowest scores that allow the identification of the strongest agreement and disagreements among stakeholders. However our analysis focus solely on the most important policy issues identified, so Q sort analysis will only be partially presented.

### **2.1. Why have we used Q methodology?**

Dealing with stakeholders can be time consuming and challenging but, bringing them into the exercise can have high benefits. The use of Q method provided valuable information to achieve the following goals, 1) definition of the system and variables, 2) the existing policy issues, 3) values and stakeholder's perspectives, 4) group of stakeholders that identify and value each policy issue, allowing a more detail stakeholder and institutional mapping.

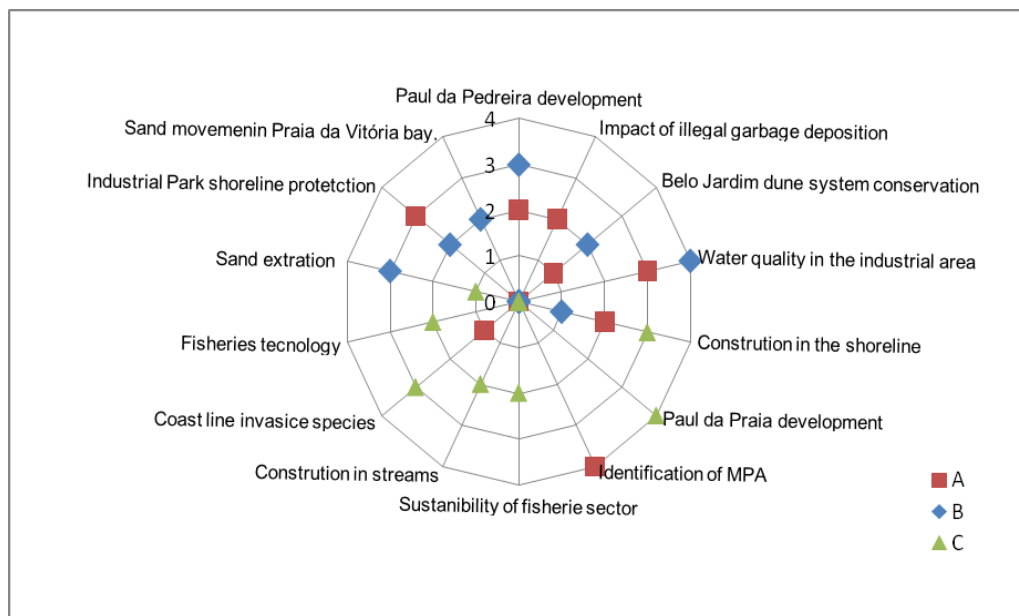
### **2.2. Why we applied Q methodology in group discussions?**

Q method is in its essence an individual exercise, meaning that all exercise is made one to one and there is no interactive process among stakeholders. As Cuppen et al, 2010 we argue that to deal with complex environmental issues, structured stakeholder dialogue is important to map out and articulate the various perspectives-values, interest, knowledge claims and underlying assumptions that exist with regard to the issue. Due to this we have also applied Q sorting in group discussions, using the

same statements and pyramid. In each group we tried to include participants with different backgrounds, knowledge, values and expertise. We have done that due to the proven fact that heterogenic groups in general produce higher quality decisions (Jehn, Northcraft et al. 1999; Dryzek and Niemeyer 2008). This results not only allowed us to better define the existing policy issue, but also, increase the level of involvement of stakeholders, improved social learning and allow us to also issue related with stakeholders interaction.

### 3. Results and Discussion

#### 3.1 Factor analysis of individual Q sorts.



**Figure 4:** Statements that received the highest positive score (4, 3, 2) in one of the stakeholders.

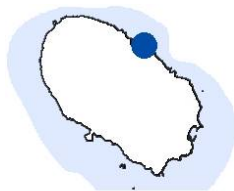
**Table 3:** Number of defining sort per stakeholder type and per perspective

| Stakeholders type                 | Factor A | Factor B | Factor C | Total |
|-----------------------------------|----------|----------|----------|-------|
| Knowledge Institutes and academia | 3        | 2        | 1        | 5     |
| Local government                  | 0        | 1        | 2        | 3     |
| Regional government               | 2        | 0        | 0        | 2     |
| ONG                               | 4        | 0        | 0        | 4     |
| Small enterprises                 | 0        | 2        | 0        | 2     |
| Total                             | 9        | 5        | 3        | 17    |

In this section the analysis is done using 17 Q questionnaires. Although 33 Q questionnaires have been performed, for this analysis we selected the ones made with more commitment and interest. This is an important aspect in Q sort analysis, since results dependent in quality and not in quantity.

### 3.1.1. Factor A: Marine Resources Exploration

Factor A (fig. 4) main concern is related with marine resources exploration and the need to identify areas for other purposes rather than fisheries (e.g. diving). Terceira Island doesn't have Marine Protected Areas (MPA), only 1 coastal area (fig. 5). Although stakeholders do not consider that marine resources are declining, they believe that MPA's could help the promotion of aquatic activities and tourism. A network of MPA's along the archipelago is being defined by the regional government, however little involvement of local stakeholders has not been promoted. This issue has been highly scored by stakeholders (table 3) related with tourism (private and government), aquatic recreation activities and researchers. All stakeholders related with the fishing sector have ranked this statement in a negative position, which underlines the possible conflict of this management action, as well as, the lack of consideration by the potential spillover effect of MPA's beneficial for fishery sector.



**Figure 5:** The protect coastal area PTTERC0018 – Costa das Quatro Ribeiras (source: European Topic Center).

In the second highest ranking, issues occurring in the coastline have been selected; the impact of coastline interventions (e.g. jetties) and pollution due to untreated waste water discharge. Again, the selection of these issues is consistent with the type of stakeholders that loaded this factor (table 3). All NGO member have loaded in factor A, which can be explain by the high level of concern by environmental protection, as well as, the high level of interaction with the environmental (e.g. some NGO members are surfers, pedestrians, etc).

In the third level of importance the issues are located deeper in the coastal zone; wetland conservation (Paul da Pedreira), solid garbage impact and urban development (e.g. roads, pavements, houses). One of the stakeholders loaded in this factor performs

the monitoring of birds while other's organize garbage removal in the Paul da Pedreira (fig. 6). All this stakeholders consider that the Paul da Pedreira should be managed in order to contribute to local biodiversity and economy. Although it's location (i.e. limit of the industrial area) and status does not promote its visitation, the area is already visited annually by bird watchers.

From the results presented in table 3 we can conclude that NGO group is rather homogeneous, since all participants from NGO's loaded in this factor. This result has also been obtained by Cuppen, Breukers et al. 2010.



**Figure 6:** Paul da Pedreira wetland and its neighbor fuel deposits area.

### **3.1.2. Factor B: Water quality**

Factor B (fig. 3) main issue is related with water quality problems. This is a very confine problem, since the statement is related with a waste water facility used by one tuna processing factory in the industrial area. This issue has also been highly ranked in the previous factor. The area of discharge is an important area for surfing practice and has been used for surf events (i.e. competitions). This policy issue is an ongoing process of negotiation between the regional government and the factory owners regarding the payment of a new waste water facility able of solving the issue. The high ranking of the topic shows the relevance given by the public. However, stakeholders directly involved on this policy issue have ranked it as indifferent, since the solution of the issue is a matter of time, rather than a matter of finding the good solution.

Wetland conservation is the second main topic being referred in the second and third raking. In the second highest ranking Paul da Pereira (fig. 6) is selected and in the third ranking the Belo Jardim zone (fig. 7). Belo Jardim zone is a natural wetland with a dune system in a high level of deterioration. Many stakeholders consider that there is no going back to a natural state of this area and ranked this issue in a negative position. However specialist and local government have ranked this issue in a high position showing that there is a chance of recovery, as well as, a governmental will to promote this action.



**Figure 7:** Belo Jardim dune system with a high concentration of juncos.

The other high ranked issue is related with coastal engineering works performed in Praia da Vitoria Bay, also identified by the previous factor. The high level of intervention in the bay (fig.8) with the construction of two large harbors, closing the bay, and small jetty's inside the bay, create a hydrodynamic not well understood (e.g. strong currents and sand movement during winter, sand accumulation in some areas and deficiency in others). Stakeholders want to better understand the evolution of these coastal interventions, so that decisions can be taken concerning the quantity of jetties, investment to recover damage jetties, location of the actual Marina, etc. Participants frequently referred the high cost of recovery of one of the harbors and one of the jetties due to the frequent storms during the winter. Stakeholders loaded (table 3) in this factor are related with local government of Praia da Vitoria, researcher related with wetland conservations and oceanography and private stakeholders related with recreation activities inside and outside the bay.



**Figure 8:** Coastal interventions inside Praia da Vitória bay (2 harbors, around 10 small jetties and a Marina) and identification of one damage jetty in 2009.

### **3.1.3. Factor C: Paul da Praia da Vitória conservation**

Factor C (fig. 3) main issue is wetland conservation related with Paul da Praia da Vitoria (fig, 9). The 3 stakeholders that loaded in this factor are implied in the recovery of Paul da Praia since the beginning of the project, thus, being the main advocates for it. Hence, the obtained result is highly related with the stakeholders loading on the factor. The recovery of this Paul has been a controversial issue; residents didn't value the area due to its history has a garbage dump, specialists were not fully engaged in the process of recovery, and the technical staff for monitoring and evaluating the actual state is reduce. In the beginning of the project a big effort has been made to discuss with the public the projects benefits and a gradual change in their opinion has

occurred. However during the interviews stage, many stakeholders posed some questions about the success of the project and the Q sort results show that more than half of the participants rank it as less important. This result is also related with public investment done so far in Paul da Praia, since is most stakeholders consider that the amount of money spend so far in the Paul should be enough to guarantee its recovery and good quality. However stakeholders working in the Paul project consider that there is a need to monitor the evolution of the Paul and understand if more intervention is needed (e.g. increase the water exchange with the sea, plantation vegetation for bird's habitat, addition of sediment to have different depths so that all bird species could use it as a feeding area).



**Figure 9:** Paul da Praia da Vitória, it's neighbor's fuel deposits and the created channels.

The second highest concern is with urban development and invasive species in the coastline. In the third ranking issues related with the fishing sector, streams and flood events were selected.

Urban development has also been pointed by factor A, while fisheries sector and invasive species were not highly ranked by any of the previous factors. Invasive species (fig. 10) proliferation is a high problem in the entire island and in Praia da Vitória some of this species are used in public structures as urban decoration. Since two of the stakeholders work for the municipality this might explain the high ranking given to this topic.

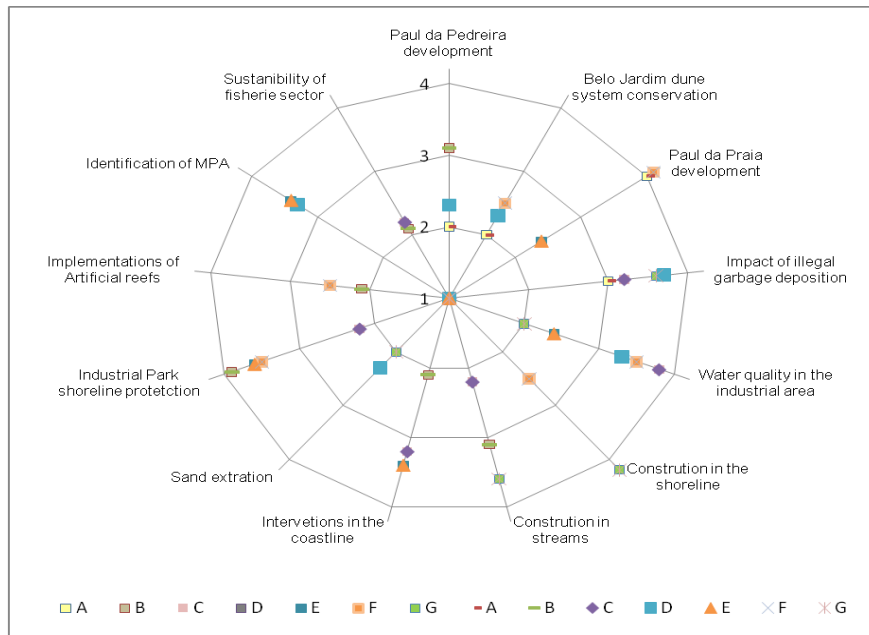
Stakeholders of this group show high sensibility for social issues, defending public participation in governmental decision, which explains the importance given to the public in the beginning of Paul da Praia recovery. This characteristic may also explain the ranking given to fisheries and flood events.



**Figure 10:** New parking facility decorated with one invasive specie.

Looking at the overall results of the individual Q sorting it is clear that stakeholders ranking and factor loading is highly related with their background and defined stakeholder type or category. The same result has been found by Cuppen et al., 2010 which indicates the adequacy of Q-Methodology assumptions. In order to have an overall view of an issue and the different perspective we can start by placing stakeholders in categories making sure that at least one stakeholder of each category is included in the process. It is also clear the over representation of one stakeholder type in one factor and the under representation in others which indicates that these stakeholders are unfamiliar with some other perspectives or issues. This underlines the importance of organizing stakeholder's dialogue that facilitates mutual learning, i.e. the interaction between stakeholders with different perspectives and from different organizational networks (Cuppen, Breukers et al. 2010). This conclusion supports the following presented results. The next section shows the changes in priorities due to the discussion within each heterogenic group. Each group had to find a consensual policy issues hierarchy. In total 27 individuals were present in the group discussions. Each session included 2 to 5 participants allowing the occurrence of 7 sessions of 2 hours each.

### **3.2. Q sort in group discussions**



**Figure 11:** Statements that received the highest positive score (4,3,2) in one of the stakeholders.

Figure 11 presents the statements that receive the highest positive score in each group discussion. The results show some difference in comparison with the results obtained with the individual Q sorting (fig. 3). Wetland conservation became one of the main policy issues identified. Paul da Praia development and Belo Jardim conservation were the topics that present the biggest change from a low ranking to a high ranking. During most of the group discussions arguments to the importance of conservation and promotion of the use of this area was registered, either by researchers or NGO member aware of the uniqueness of this habitats in the Azores and the potential for promoting ecotourism activities that occur all year long.

Pollution continues to be highly ranked issue; illegal garbage deposition and water quality problem in the industrial area. Water quality however is an example of a short term policy issue. Group A, that included a member of the Industrial Waste Water Treatment Department, ranked the issue in a low position. During the discussion the participant explained that it's only a question of time for the situation to be solved. The solution has been already defined and the only decision that needs to be done concerns the governance dimension – who will pay the investment. Hence, focusing SAF application in this topic would be unfruitful since the decision has already been made, although the concern continue, explaining the ranking on all other groups.

Illegal garbage disposal occurs along different areas in the island, many inside of the island, other in cliffs and along the coastline. However along group discussions it



was clear the associated made of this issues and the actual state of Paul da Pedreira, since this area was frequently used as an evidence of the occurrence of illegal garbage disposal (fig. 12).



**Figure 12:** Illegal garbage disposal in Paul da Pedreira.

Paul da Pedreira is not a natural environment, it's formation occurred around 15 years ago when rocks were taken from an area in the limit of the industrial park, for the construction of the second biggest harbor of this bay. The intensity of the extraction was high and the groundwater level became uncovered allowing the influence of tide along the quarry, creating what is nowadays called Paul da Pedreira. When the mining activities ceased the conditions were favorable for the establishment of bird communities, making this artificial area an important habitat for migratory and non-migratory birds. Along the years the importance of this area increased within the international community of bird watcher, being visited every year and frequently referred to in the website: [birdwatchinginazores.com](http://birdwatchinginazores.com). However, for the local population its value is minimal and the area is frequently used for illegal garbage deposition. During discussion it was agreed that if the image of Paul da Praia changed and its value recognized by local people illegal garbage disposal would disappear. Group B included the responsible for the inspection of illegal garbage deposition. In this group and also in group E and F this policy issue was ranked in a lower position, because it was consensual that only increasing environmental awareness of local people, as well as, increasing the control, the problem could be solved.

Urban development policy issue was also highly ranked by 4 of the 7 groups. For most of the participants this is a false issue, since the Management Plan for the coastline (POOC) has already been approved and any attempt to support decision on this will have to be in accordance with this plan. The issue might be relevant in a few years when POOC goes into a revision process.

Coastline interventions continue to be highly ranked mainly due to the level of interventions in Praia da Vitória bay. Since public investment is used to maintain the present structure of the bay, it is reasonable to question the relevance of all the jetties.

Since this is a unique bay in Azores archipelago (i.e. the longest sandy beach) stakeholders want to better understand if this environmental value can be maintain and better explored.

The issue concerning coastline intervention is also discussed outside the bay. The position of the Industrial Park (which includes the fuel deposition area) has been a common topic of critics because of its proximity to the sea which makes it a vulnerable to environmental hazardous. In order to decrease this vulnerability there is a need to protect this coastline. The scenario of more jetties and cementation of the coastline is a concern identified by many stakeholders, due to its possible interference with tidal influence in Paul da Pedreira and changes in the wave formation. During 2 group discussion (group B and F) a scenario as already emerged towards an alternative to the commonly used techniques of coastal protection: the use of artificial reefs. This explains the mutual high ranking the two topics.

Finally the fishery sector has also been ranked in high position. The importance of MPA was highlight by 2 groups (D, E) that again include element related with diving activities, tourism promotion and environmental protection. Sustainability of the fishing sector was highly ranked in 2 other groups (B e C). Group C included two people from the fishery sector and the decision to rank this issue in one of the 6 most important was mainly due this fact.

### **3.3. The search for consensus: cluster analysis of the results**

The discussion above has demonstrated the potential of heterogenic group discussions towards mutual social learning. Results show relevant changes in priority due to the interaction among stakeholders of different backgrounds.

The following discuss involves the issue of dominance and building consensus. Each participant in the group discussion had previously defined their one ranking of the policy issues. This data and the resulting Q sorting in group discussions were used in cluster analysis to understand if in any group there was a dominate participant. Each meeting was facilitated by a research member. It's role on the meetings was the promotion of discussion by asking for each statement the decided position. The interference with the discussion was minimal, allowing each group to organize themselves. Another member of the research team was taking notes on the behavior of each participant. The qualitative data obtained show that in two groups (C and G) there was clearly dominance of one participant in the discussion. Results obtained in cluster analysis support that evaluation (fig. 13). The first cluster obtain was

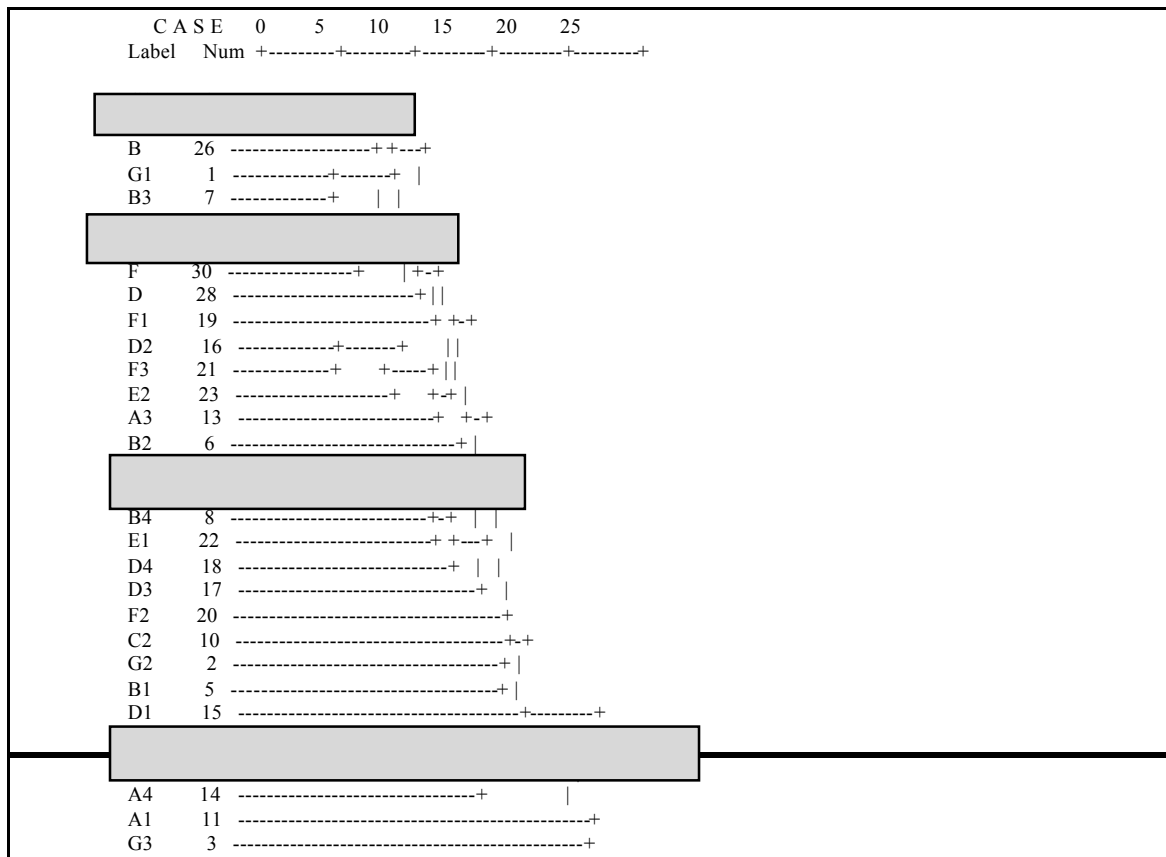
of individual C1 with group C. This individual was clearly identified by the research group and the intensity of its dominance was so high that the facilitator had to mediate so the other participants could express their opinion.

In group G the dominance was identified but on another level. While participant C1 dominated the discussion by talking for long periods and not allowing others to express their opinion, participant G4 was a dominator due to its rhetoric and also due to its social position. The participant G4 is a teacher and researcher of the University of the Azores, while 2 other members of the meeting had been his students. This participant's relation was obvious by the tone and expressions of respect for G4 participant opinion. Although all member had a chance to express their opinion many arguments used by participant G4 were accepted, without much discussion. This cluster was only formed in stage 11 of the cluster process that occurred in 30 stages, which express that although this result was expected, the level of dominance was much smaller than within group A.

Cluster analysis also identified two other dominance situations that were not documented by the research team during meetings. Group E was more influence by element E3 than by the other 2 elements in the discussion. This was not detected by the research group and the qualitative data obtain in this group shows that it was a balance discussion. However, looking deeper into the background of each participant it is clear that element E3 has more experience with different policy issues occurring in that coastal area. This element is an element of the Surfing Association that organizes surfing events on the area and frequently visits it to practice the activity. He is also a master student doing is thesis on Paul da Pedreira. Although the discussion has been balance it is possible that the information exchange was higher from element E3 to the others. Hence this cluster is not related with dominance characteristics but more with a unidirectional flow of information from element E3 to the other elements of the discussion.

Finally, an interesting cluster was found in group A in the 22<sup>nd</sup> and 23<sup>rd</sup> stage of cluster analysis. Element A2 and A4 have highly influence the selection process of group A that included two more elements. Again this can be explained be the amount of knowledge these elements have on the coastal dynamics of the municipality. In many moments of discussion this two elements provided important information that would them be used by the group to define the position of that statement (e.g. Paul da Pedreira, waste water problem in the industrial area).

Results of the remaining 3 groups do not show any pattern which indicates that the individual decision of each participant was changed during group discussions.



**Figure 13:** Dendrogram using Single Linkage - Rescaled Distance Cluster

Combine

#### 4. Final considerations

Results obtained by individual Q sorting have changed by the use of participatory methodologies (i.e. group discussion). This results support the notion that for multidimensional issues there is a need to use more complex and time consuming approaches that will allowed a clear distinction of the level of significance of the policy issues.

Group discussions are fruitful since social learning is very high however facilitation needs to be well defined so that issues of dominance and or submission of participants can be overcome. The search for consensual results increases the importance of this issue.

From the results obtain two clear policy issue have been identified; wetland conservation and coastline intervention inside and outside the Praia da Vitória bay.

## References

- Addams, H. and J. Proops, Eds. (2000). Social discourse and environmental policy: an application of Q methodology Massachusetts, Edward Elgar Publishing, Inc.
- Aranda, S. C., R. Gabriel, et al. (2010). "Assessing the completeness of bryophytes inventories: an oceanic island as a case study (Terceira, Azorean archipelago)." Biodiversity Conservation: 16.
- Azevedo, E. B. (1996). Modelação do Clima Insular Escala Local. Modelo CIELO aplicado ilha Terceira. University of Azores, Angra do Heroísmo. Angra do Heroísmo, University of Azores. **PhD Thesis**.
- Barry, J. and J. Proops (1999 ). "Seeking sustainability discourses with Q methodology " Ecological Economics **28**: 337-345.
- Clayton, M. (2001). "Current systems in psychology: History, theory, research, and applications." Psychological Record **51**(3): 495-497.
- Costanza, R., Ruth, M., 1998. Using dynamic modeling to scope environmental problems and build consensus. Environmental Management 22, 183-195.
- Cuppen, E., S. Breukers, et al. (2010). "Q methodology to select participants for a stakeholder dialogue on energy options from biomass in the Netherlands." Ecological Economics **69**(3): 579-591.
- de Kok, J.L., Booij, M.J., 2009. Deterministic-statistical Model Coupling in a DSS for River-Basin Management. Environmental Modeling & Assessment 14, 595-606.
- Dryzek, J. S. (1990). Discursive Democracy. Politics, Policy and Political Science. Cambridge, Oxford University Press.
- Dryzek, J. S. and S. Niemeyer (2008). "Discursive Representation." American Political Science Review **102**(4): 481-493.
- Eftcc, E.f.t.E.C., 2006. Valuing Our Natural Environment. For Department for Environment, Food and Rural Affairs, London.
- E.C., E.C., 2005. Establishing a Framework for Community Action in the field of Marine Environmental Policy (Marine Strategy Directive). In: final, C. (Ed.).
- E.C., E.C., 2008. Roadmap for Maritime Spatial Planning: Achieving Common Principles in the EU. In: COM (2008) 791 final (Ed.).
- EC, 1999. Towards a European Integrated Coastal Zone Management (ICZM) Strategy: General Principles and Policy Options. In: Luxembourg: Office for Official Publications of the European Communities (Ed.).

- Glassner, M. I. (1993). "The development of intergrated sea-use management" - SMITH,HD, VALLEGA,A." Progress in Human Geography **17**(2): 298-299.
- Goodman, L. A. (1961). "Snowball sampling" Annals of Mathematical Statistics **32**(1): 148-170.
- Goosen, H., Janssen, R., Vermaat, J.E., 2007. Decision support for participatory wetland decision-making. *Ecological Engineering* 30, 187-199.
- Guimarães, H.M., Cunha, A.H., Nzinga, R., Marques, J., submitted. The distribution of seagrass (*Zostera noltii*) in the Ria Formosa lagoon system and the implications of clam farming on its conservation status. *Journal for Nature Conservation*.
- Guimarães, H. (2010). "The use of Q-methodology to obtain stakeholder Discourses on the future development of Ria Formosa Coastal zone, south of Portugal. ." Revista Portuguesa de Estudos Regionais **23**: 5-19.
- Hamouda, M.A., Anderson, W.B., Huck, P.M., 2009. Decision support systems in water and wastewater treatment process selection and design: a review. *Water Sci. Technol.* 60, 1757-1770.
- Heckathorn, D. D. (2002). "Respondent-driven sampling II: Deriving valid population estimates from chain-referral samples of hidden populations." Social Problems **49**(1): 11-34.
- Hisschemoller, M., 2005. Participation as knowledge production and the limits of democracy. *Democratization of Expertise?* 24, 189-208.
- Jehn, K. A., G. B. Northcraft, et al. (1999). "Why differences make a difference: A field study of diversity, conflict, and performance in workgroups." Administrative Science Quarterly **44**(4): 741-763.
- Kallis, G., Videira, N., Antunes, P., Pereira, A.G., Spash, C.L., Coccossis, H., Quintana, S.C., Del Moral, L., Hatzilacou, D., Lobo, G., Mexa, A., Paneque, P., Matcos, B.P., Santos, R., 2006. Participatory methods for water resources planning. *Environment and Planning C- Government and Policy* 24, 215-234.
- Marjolein, B.A.V., Rijkens-Klomp, N., 2002. A look in the mirror: reflection on participation in Integrated Assessment from a methodological perspective. *Glob. Environ. Change-Human Policy Dimens.* 12, 167-184.
- Martinez-Alier, J., Kallis, G., Veuthey, S., Walter, M., Temper, L., 2010. Social Metabolism, Ecological Distribution Conflicts, and Valuation Languages Introduction. *Ecological Economics* 70, 153-158.

- Morton, B., J. C. Britton, et al. (1998 ). Ecologia Costeira dos Açores. São Miguel, Açores, Portugal, Sociedade Afonso Chaves
- Ostrom, E., Cox, M., 2010. Moving beyond panaceas: a multi-tiered diagnostic approach for social-ecological analysis. *Environmental Conservation* 37, 451-463.
- Pearce, D., Atkinson, G., Mourato, S., 2006. Cost-Benefit Analysis and the Environment - recent developments. OECD Publishing.
- Robbins, P. and R. Krueger (2000). "Beyond bias? The promise and limits of Q method in human geography." Professional Geographer **52**(4): 636-648.
- Salganik, M. J. and D. D. Heckathorn (2004). "Sampling and estimation in hidden populations using respondent-driven sampling." Sociological Methodology, Vol 34 **34**: 193-239.
- Sampaio, A. (1904). Memoria sobre a Ilha Terceira. Angra do Heroismo, Imprensa Municipal.
- Santos, R. S., S. Hawkins, et al. (1995). "Marine research, resources and conservation in the Azores." Aquatic Conservation-Marine and Freshwater Ecosystems **5**(4): 311-354.
- Schmolck, P. (2002). Pqmethod [www.rz.unibw-muenchen.de/~p41bsmk/pqmethod/](http://www.rz.unibw-muenchen.de/~p41bsmk/pqmethod/).
- Serpa, J. (1886). A industria Piscatoria nas Ilhas Fayal e Pico. Opusculos Açorianos. Coimbra, Imprensa Academica. **I**: 1-18.
- Smith, H. D. (2001). "The industrialisation of the world ocean." Ocean & Coastal Management **44**(9-10): 563-566.
- Stephenson, W. (1935). "Correlating persons instead of test" Character and Personality **4**(1): 17-24.
- Videira, N., Antunes, P., Santos, R., 2009. Scoping river basin management issues with participatory modelling: The Baixo Guadiana experience. *Ecological Economics* 68, 965-978.
- Webler, T., S. Tuler, et al. (2001). "What Is a Good Public Participation Process? Five Perspectives from the Public." Environmental Management **27**(3): 435-450.
- Westmacott, S., 2001. Developing decision support systems for integrated coastal management in the tropics: Is the ICM decision-making environment too complex for the development of a useable and useful DSS? *Journal of Environmental Management* 62, 55-74.