8 Socio-economic aspects stakeholders and decision making

Rob Jongman\textsuperscript{22}, Helena Berends\textsuperscript{23} and Luc Boerboom\textsuperscript{24}

For decision making participation of stakeholders is important. They have been involved in the project in all phases. In the first meeting the problem of the Taquari has been discussed with all stakeholders, local and regional authorities, farmers, NGOs and researchers (Figure 8.1). This has led to the problem statement as formulated in chapter 1. In later phases the contact with stakeholders and authorities involved has been maintained through direct contact (Agência Nacional de Águas, Secretaria de Recursos Hídricos) and stakeholder meetings. Also a workshop has been organized with individual knowledge bearers from the region for participation in the scenario building. Several workshops have been held during the project. One was held with local knowledge holders on the species in the Pantanal to create the scenarios.

\textbf{Figure 8.1} Active participation in the first Stakeholder Workshop, Corumbá 2003.

In the first workshop the knowledge from Brazil and the Netherlands has been compared and matched; the problems and the possible solutions discussed. Already in this workshop the disappearance of the flood pulse in the Taquari basin as important mechanism was one of the foci in the discussion. The decline of fish stock data are compared for the periods: 1979 until 1983 and 1994-1999 ids obvious. In the first period fish was abundant, but this is now reduced especially in the river Taquari. The cause of this reduction can be found in the disruption of the flood pulse. The regular flooding of the Pantanal area provides the river water with an influx of organic material which is food for many fish species at the bottom of the food chain. Statistics

\textsuperscript{22} R.H.G. Jongman, Alterra Wageningen UR, e-mail: rob.jongman@wur.nl
\textsuperscript{23} H. Berends, Regenboog Advies, Wageningen e-mail: helena.e-mail info@regenboogadvies.nl
\textsuperscript{24} L. Boerboom, ITC Enschede e-mail: Boerboom@ltc.nl
show that especially the fish on the basis of the food chain have become greatly reduced in the river Taquari with enormous consequences for the whole ecosystem.

In this first stakeholder meeting the farmers were well represented and they are the other party that suffered from the flooding of the Taquari. Some have reduced production capacity and some have even lost their land.

How the possible outcome should be evaluated has been introduced and discussed as well. It has been concluded, that when evaluating plans and policies it must be considered that:

- Measures to protect the environment are not always non-economic. On the contrary, there are many examples where nature and economy have both benefited: like recycling and saving energy.
- It should be possible to value the importance of nature. Up to now, there are different ways to assess the value this, such as the objective of visiting and the relation with the ecosystem involved. That gives a link with local or regional economy.
- It is important that people participate, because participation appears essential when dealing with public-private interactions.

How people can participate and where their influence is situated has been demonstrated by the example from Mato Grosso on the Upper Paraguay River. The perception of these stakeholders on the ecological, social and cultural aspects of the spatial changes in the area was presented including an overview of the levels of influence, interaction, and relation of competition and collaboration among stakeholders. The stakeholders can be roughly divided into four groups:

1. Public representation such as the Ministry of Environment, Agência de Águas, IBAMA
2. Land owners, Enterprises
3. Local NGOs, local forum, community associations
4. Public policy: Transportation, Waterway (Hidrovia), Energy (dams), Fishery legislation, Tourism, Pantanal Program

It was conclude that committees and councils can facilitate an integrated and participative management of the Pantanal as long as it includes all stakeholders and is based on local social organization; as long as it strives for consensus and decentralizes power and guarantees a process of decision making that is equitable and transparent.

From this first workshop the following conclusions have been drawn:

- The local fish population has been impoverished by the breaking of the food chain. According to the people involved the reaction of authorities to the problems has been late; care must now be taken that all stakeholders will be treated equally in the process, but with special attention to the local population who has suffered most. The law must be used to protect environment and people likewise. At the moment the law is not always in line with the wishes of the local people. The project is designed to help stakeholders to make a decision on the solution of the problem. The Taquari area is highly sensitive and therefore one should not rush to a decision.
- The hydro-electrical companies have established already 60 water committees which are democratic and participative. The Taquari region urgently needs water boards like these. The government has started the process by establishing Technical committees, who are developing an Action Plan and starting pilot projects with aspects in participation and monitoring.
- Attention should be given to the livestock sector as an important economic factor in the region.
- LEDESS is not used for simply assessing cause and effect, but is structuring spatial knowledge and shows effects of measures taken.

The farmers’ organization proposed a number of possible solutions, such as:

- constructing a dam to keep the sediment from coming into the river
- to re-establish the flood pulse and therefore remove sand from the river bed.
The Pantanal-Taquari project will assist the stakeholders in their search for a solution, but it must first create an understanding of this complex problem. Important is that all parties are involved and that solutions will benefit all and not reallocate problems.

During the project contact has been maintained with the stakeholders in several moments. Communication has taken place between the research groups and stakeholders at various levels (authorities (ANA, Ministry of Environment, FEMA, IMA-P), agricultural and environmental non-governmental organizations, researchers, individual farmers and fisherman and people in the street.

With people in the Corumbá interviews have been held to develop insight in their visions and ideas. The questions asked were:
- What do you see happening in the Pantanal?
- What does the Pantanal mean to you?
- What is your dream for the Pantanal?
- What needs to be done to reach this dream?

This resulted in three social scenarios:
- Using and developing the natural resources carefully: This future is based on cattle breeding and fishing, allowing for (non predatory) tourism, with sufficient social services for the local population. It is a continuation of the existing development path, but with more attention to nature conservation and to social services
- Conservation scenario: Many people mentioned the beauty of the Pantanal that needs to be preserved. In this scenario the region is a nature sanctuary, to be visited and enjoyed by those who love it and for research purposes. It requires international and national funding. (The example of the Mamirauá reserve in the Amazon shows that this is possible.)
- Bringing industrialisation to the region: Many people mentioned the gasoduct with Bolivia and the plans to make an electricity generating plant and new industries in Corumbá. This would provide jobs, reduce poverty and make the conservation of the Pantanal possible, many thought...

Figure 8.2 Interviews in the streets of Corumbá

A special workshop has been held for training of EMBRAPA and university staff on spatial decision support methodology. Staff from both EMBRAPA and the university was enthusiastic
about concepts of spatial decision support systems discussed. Sessions were even extended to gain more depth.

By differentiating between scenarios (i.e. changes of the uncontrollable system environment) and alternatives (i.e. changes the controllable/manageable system) it could be shown that the existing list of alternatives (Table 8.1) was really a mix of scenarios, alternatives and even criteria, each addressing different problems and therefore most not being alternative solutions to the same problem.

The absence of a decision unit where stakeholders define common problems, to which alternative solutions are sought at an appropriate scale of control, is an important reason for the confusion. Moreover, the absence of an evaluation structure for alternative solutions before they are being developed prevents the design of solutions (i.e. value-based design) which actually address the problems.

Table 8.1 List of alternative solutions for the Taquari problem

<table>
<thead>
<tr>
<th>Nr</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Business as usual</td>
</tr>
<tr>
<td>2</td>
<td>Closing side channel</td>
</tr>
<tr>
<td>3</td>
<td>Stop erosion in the highlands</td>
</tr>
<tr>
<td>4</td>
<td>Impact barriers: paved roads</td>
</tr>
<tr>
<td>5</td>
<td>Hidrovia Paraguay</td>
</tr>
<tr>
<td>6</td>
<td>More floods and precipitation (scenario)</td>
</tr>
<tr>
<td>7</td>
<td>Less cattle more fire (impact)</td>
</tr>
<tr>
<td>8</td>
<td>Dredging Taquari</td>
</tr>
<tr>
<td>9</td>
<td>Dam at Coxim</td>
</tr>
<tr>
<td>10</td>
<td>Organized maintenance (river management)</td>
</tr>
<tr>
<td>11</td>
<td>Financial compensation for farmers</td>
</tr>
<tr>
<td>12</td>
<td>National park</td>
</tr>
<tr>
<td>13</td>
<td>Help Coronal river form its bed</td>
</tr>
<tr>
<td>14</td>
<td>Improve cattle production</td>
</tr>
<tr>
<td>15</td>
<td>Corumbá/Pantanal development alternatives</td>
</tr>
<tr>
<td>16</td>
<td>Industrial development</td>
</tr>
<tr>
<td>17</td>
<td>Conservation development</td>
</tr>
<tr>
<td>18</td>
<td>Tourist development</td>
</tr>
</tbody>
</table>

Figure 8.3. Hypothetical decision problem structure, to evaluate performance of the Pantanal under three different hydrologic conditions.

Principles of decision making and the need for a decision unit were discussed as well as the principles of multicriteria evaluation. Also, an example spatial multicriteria evaluation was performed in ILWIS (Figure 8.3) using the habitat capacity data generated by the Pantanal
Ledess model. Three scenarios as depicted in chapter 6 (dry, average, and wet scenario) were evaluated to demonstrate the principles of spatial multicriteria evaluation. The underlying decision concept was that in the absence at this point of alternative solutions, an evaluation of scenarios could obtain insight whether eventual alternative solutions should aim to make certain areas in the Pantanal drier or wetter. In the absence of a formalized evaluation structure and priorities, hypothetical structure and priorities were used (Figure 8.3).

Also, hypothetical value functions (Table 8.2), which give utility to the data and standardize the different dimensions/units of the criteria to the same dimensionless scale, were used. Although hypothetical, these value functions might very well approach real value functions, but they have not been reviewed as such and at this point there was not much sense in doing so.

Table 8.2. Hypothetical value functions.

The example leads to a spatial evaluation of overall performance of the Pantanal alluvial fan area under different hydrological conditions (Figure 8.4). Due to the structuring of the problem the wet conditions are preferred, because this hypothetical analysis assumes Jacaré hunting areas to be of main interest.

Figure 8.4. Overall performance of the Pantanal alluvial fan area under different hydrological scenarios (dry, average, and wet). Green areas perform well and red areas perform poorly, given the criteria structure, the prioritization of criteria and assessment of value functions.

On November 23 2004 the final results were presented at the Sindicato Rural, the farmers’ organisation. Causes, scenarios and technical solutions have been discussed. Present were about 70 persons, farmers, members of NGO’s, EMBRAPA staff, officials from policy.

After the presentations of the research results and the analysis of the potential solutions (see chapter 8) a lively discussion started on the results and the possible solutions. The conclusion was that there are several technical and economic options, but the financial situation makes it best to look for the cheaper solutions. All agreed that solutions downstream have to be integrated with upstream solutions. The meeting decided at the end to set up a working group of