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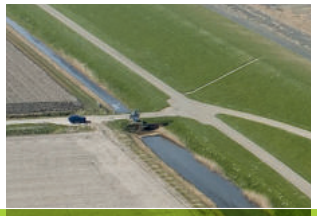



Added Value of Joint Action, a workshop methodology

The workshop methodology 'Added Value of Joint Action' is developed to help stakeholders understand the benefits of multifunctional approaches and joint action. In a structured and step-wise approach workshop participants find out what they can achieve alone and in cooperation, what the value is of different strategies, and ways for equal sharing of the winnings. The workshop methodology is rooted in game theory.

Social dilemma of multifunctional concepts

Multifunctional approaches such as nature-based flood defences and multifunctional dikes combine flood safety with nature, recreation and housing. Combining functions potentially involves a win-win for the parties involved. However often these situations present a social dilemma: cooperation may be beneficial from the perspective of the group, but for the individual party cooperation is not the most attractive option. Multifunctional concepts require joint action, but due to present social dilemma's cooperation will not come about without additional process support. Stakeholders need to become familiar with what can be achieved when they cooperate and also how all parties involved can be satisfied with the chosen alternative.

During the workshop participants find out what they can achieve alone and in cooperation, what the value is of different strategies, and how the winnings can be shared equally. The workshop consists of four parts: introduction, outcome discovery, outcome assessment and analysis, and discussion and action perspective.

Salt marshes are located in front of a dike. Waterboards are responsible for the dike and flood risk management, while nature NGO's own the salt marsh and farmers rent the salt marsh for grazing. Using vegetated foreshores for flood risk reduction would require among these three stakeholders.

Case example: vegetated foreshores for flood risk reduction

The workshop methodology is particularly useful in exploration of innovative strategies that are cross-sectoral and multifunctional and in investigating joint action possibilities. This case example concerns vegetated foreshores for flood risk reduction.

Cross-sectoral cooperation required

Vegetated foreshores for flood risk reduction are a multifunctional concept which requires cross-sectoral cooperation. Salt marshes as part of the flood defence barrier can significantly reduce dike reinforcement and maintenance costs.

Waterboards are responsible for the dike and flood risk management, while nature NGO's own and manage the salt marsh, farmers rent the salt marsh for cattle grazing. Cattle's grazing is essential for natural value as without salt marshes would grow to be a homogenous, low-biodiverse foreland. The workshop methodology 'Added Value of Joint Action' allows for exploration and evaluation of cooperative outcomes between these players.

Getting acquainted is an essential part of the workshop

Step 1 Introduction of the players

Participants in the workshop make an extensive introduction of their objectives, ambition, means and interest. A good understanding of positions contributes to trust building and discussions during the workshop.

Coalition	Nature NGO (N)	Farmers (F)	Waterboard (W)	Outcome
'F'		●		Farm management
'FW'		● +	●	Vegetation flood mark
'NFW'	● +	● +	●	Optimum foreshore for flood risk reduction
'W'			●	Traditional dike
'NW'	● +		●	Vegetated foreshore for flood risk reduction
'N'	●			Max nature
'NF'	● +	●		Biodiversity grazing

Figure 3 Seven coalitions can be formed in the vegetated foreshores for flood risk reduction case. Each coalition can achieve a specific outcome.

Step 2 Outcome discovery

In the second step participants explore what outcomes can be achieved alone, in duo-coalitions and in the broad coalition. The result is an overview of all possible coalitions and outcomes.

Coalition and outcomes	Biodiversity	€ costs	Integrality	Σ payoff
Coalition 'N'	3	3	1	7
Duo-coalition 'NF'	4	3	3	10
Duo-coalition 'NW'	3	4	4	11
Grand coalitoin 'NWF'	4	4	4	12

Table 1 Outcome assessment by the nature NGO. The nature NGO values the outcomes by rating the criteria biodiversity, costs and integrality on a 1-4 scale. The sum of these values represents the payoff for the nature NGO of a particular coalition and outcome.

The waterboard ('W'), Nature NGO ('N') and the Farmers ('F') allow for seven coalitions to be formed: 'W', 'N' and 'F'; duo-coalitions 'WF', 'WN', 'NF' and the grand coalition 'WNF'. Each coalition can achieve a different outcome. For example, the waterboard alone would reinforce the dike in a traditional manner, while in a duo with the nature NGO a salt marsh would be part of the flood defence. Or, the duo-coalition between the nature NGO and famers would be able to optimise grazing for biodiversity purposes (see Figure 3).

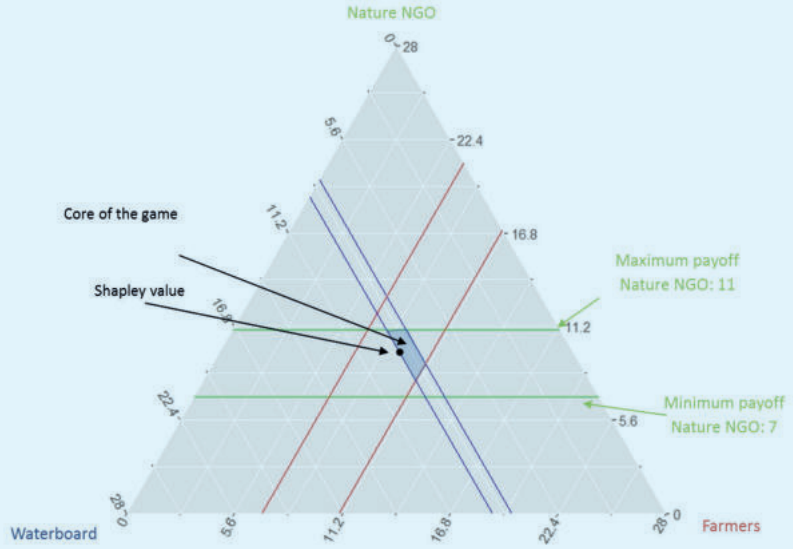
Outcomes	Waterboard	Nature NGO	Farmers	Total
No cooperation: coalition 'W', 'N' and 'F'	8	7	7	22
Duo-coalition 'NF' and coalition 'W'	8	10	9	27
Duo-coalition 'NW' and coalition 'F'	6	11	7	24
Duo-coalition 'FW' and coalition 'N'	9	7	8	24
Grand coalition 'WNF'	7	12	9	28

Table 2 Payoff table vegetated foreshores for flood risk reduction case. Currently there is a situation of no cooperation among players, which yields the lowest total payoff. The highest total payoff is for the grand coalition WNF.

Step 3 Outcome assessment and analysis

Participants establish the payoff value of each outcome using a multi-criteria table. For example, the nature NGO values outcomes based on the criteria 'biodiversity', 'costs' and 'integrality' (Table 1). Using a 1-4 scale, payoffs for each possible outcome are calculated.

Based on the full payoff scheme, including payoffs provided by the waterboard, nature NGO and farmers (Table 2) workshop facilitators analyse the case. First step is an analysis of cooperation value for the participants. It is analysed whether the total payoff of the grand 'WNF' coalition can be distributed to satisfy all participants (i.e. participants don't leave the grand coalition since cooperation yields more than not cooperating). In this case example the grand coalition is attractive to all participants, as is shown by the presence of the 'core' in the ternary plot (Figure 4). Second step, is to look for a fair distribution of the winnings by using game-theory solution concepts. One such concept is the 'Shapley value', in which participants are rewarded according to their contribution to the coalition. In the case example the waterboard would earn 9, the nature NGO 9,5 and the farmers 9,5. While these numbers do not translate to actual revenues and should be understood as relative numbers, it provides input for discussion on how to organise cooperation.



This ternary plot depicts the minimal and maximal winnings of three stakeholders in a vegetated foreshore for flood risk reduction project. When all stakeholders can earn more than their minimal (i.e. individual) winning, cooperation is beneficial for the group. This situation is visualised by the 'core' of the game. The Shapley value is a solution concept in game theory for equal distribution of the winnings. The analysis of this stakeholder-game forms the basis for understanding dependencies among stakeholders and value of cooperation and provides input for discussing joint action

Step 4 Discussion and action perspective

In the last part of the workshop the results of the analysis are discussed and interpreted. What is needed to achieve the cooperative potential, what is expected of the different participants, and what are conditions for future success?

The analysis has shown that the situation of non-cooperation between the participants is sub-optimal. However, payoff re-distribution is needed because the value that participants award to the grand coalition does not represent a fair (Shapley) distribution of winnings. The waterboard for example values the grand coalition with '6', while '9' would be fair based on their contribution. The workshop discussion should reflect what is needed for the grand coalition to succeed. What can participants demand and what conditions need to be met for successful joint action?

This ternary plot depicts the minimal and maximal winnings the participants in the vegetated foreshore for flood risk reduction case example. When all participants can earn more than their minimal (i.e. individual) winning, cooperation is beneficial for the group (or grand coalition). This situation is visualised by the 'core' of the game. The Shapley value is a solution concept in game theory for equal distribution of the winnings. The analysis forms the basis for understanding dependencies among participants and value of cooperation and provides input for discussing joint action.

▶This workshop is part of the project BE SAFE: Bio-Engineering for safety using vegetated foreshores

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