A practical method for selecting stakeholders in local landscape planning for ecosystem services

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Abstract

Natural processes in the landscape deliver a variety of ecosystem services to society. Consideration of ecosystem services in local landscape planning is supposed to provide a conceptual basis for balancing social, economic and ecological values. In order to organize a community-based landscape planning process, approaches are needed to select relevant stakeholders. The aim of this study was to develop a method for selecting stakeholders of ecosystem services for involvement at the start of a community-based process. Community-based landscape planning was considered as a market situation of supply and demand, involving on the one hand actors who can contribute to the supply of ecosystem services and on the other hand actors with an interest in these services. Using insights from the field of stakeholder analysis, guidelines were proposed for the identification, characterization and prioritization of stakeholders of ecosystem services. The principles of the developed method were applied on a case study in the Hoeksche Waard in the Netherlands. The proposed method can serve two purposes. First, it is intended to assist practitioners in the initiation of planning processes focused on ecosystem services. Second, the method can be applied to study the relationship between stakeholder selection and outcomes of planning processes. By serving these two purposes, the study may contribute to the application of the so far mainly scientific concept of ecosystem services in the practice of landscape planning.

Key words: community-based landscape planning, stakeholder analysis, demanders and suppliers of ecosystem services, identification of interest groups, selection criteria, level of interest, level of power

Contents

1. Introduction

Natural processes in the landscape deliver a wide variety of services to society. Examples are the production of timber or food, but also more invisible services, like natural pest control or the purification of water and air. All these services are also called ecosystem services. The concept of ecosystem services can be seen as a link between landscape or ecosystem properties and human well-being (MEA, 2005). Taking ecosystem services into account in landscape planning and management can lead to a landscape that better fulfills economical, ecological and social values (Termorshuizen & Opdam, 2009).

In recent years the concept of ecosystem services increasingly gets attention of researchers, especially since the publication of the Millennium Ecosystem Assessment (MEA) in 2005 (De Groot et al., 2010). The MEA indicated a degradation of ecosystem services over the last 50 years as a consequence of people's lifestyles. Although the attention of researchers has increased, De Groot et al. (2010) recognize that still many challenges need to be addressed to fully integrate the concept of ecosystem services into the practice of land-use planning and decision making. Up to now, the interface between ecosystem services and spatial planning processes has received limited attention. Most of the scientific literature is focused on the classification, mapping, quantification and valuation of ecosystem services (Hermann et al, 2011). In addition, these studies are often related to a broad spatial scale, which does not fit to the occurring trend towards decentralized and collaborative spatial planning processes in most democracies (Termorshuizen & Opdam, 2009).

The trend towards decentralized and collaborative spatial planning processes implies the involvement of multiple actors with diverse and often conflicting perspectives. The concept of ecosystem services basically is a stakeholder-driven concept; it assumes that human well-being is a driver of landscape management and development (Menzel & Teng, 2009). Therefore, landscape developments related to the delivery of ecosystem services also concern multiple actors. Temorshuizen & Opdam (2009) and Steingröver et al. (2011) describe how a process of landscape development can be considered as a market situation of supply and demand. Ecosystem services provide several benefits to multiple actors. These beneficiaries can also be described as the potential demanders of ecosystem services. Besides this, there are actors who own and manage the natural or semi-natural elements in the landscape. These actors are able to influence the delivery of ecosystem services, and are therefore potential suppliers of ecosystem services. To organize a community based landscape planning process, there is a need for approaches to select relevant stakeholders.

Stakeholder analysis is an approach or set of tools that can be used to gain insight into relevant stakeholders, their characteristics and interrelationships. In the early 1980s stakeholder approaches and methodologies started to develop in the field of business management (Grimble and Chan, 1995). Nowadays, stakeholder analyses are widely applied in other fields, like public policy, development studies, health care management and natural resource management (Brugha & Varvasovsky, 2000). The parallel development of stakeholder analysis in different disciplines has resulted in a variety of approaches and methods (Reed et al, 2009). Depending on the purpose and context of a specific application, a different focus and different methods for data collection and analysis are required (e.g. Grimble and Chan, 1995; Brugha & Varvasovsky, 2000). At the moment, there is a lack of stakeholder literature focused on application in the field of ecosystem services. An exception is the work of Reed et al. (2009). These authors review a range of stakeholder analysis

methods and illustrate the application of these methods through a series of case studies. In two of these case study projects, stakeholders are linked to different ecosystem functions. However, a systematic approach to identify and select stakeholders for involvement in a process of landscape planning for ecosystem services is still absent. An understanding of the network of actors involved can contribute to the integration of the concept of ecosystem services in the practice of landscape planning.

The **aim** of this study is to develop a method to identify and prioritize actors who constitute the network of potential suppliers and demanders of ecosystem services in a certain area. The research focuses on involvement at the start of the process. In this way, the study can contribute to the initiation of processes in which alignment between supply and demand of ecosystem services is pursued. This research objective results in the following **research questions**:

- How can potential demanders and suppliers of ecosystem services be identified?
- Which criteria can be used to characterize potential demanders and suppliers?
- How can the identified actors be prioritized for involvement at the start of a process concerning the development of ecosystem services?

Reading guide

The report continues with some background information about the concept of ecosystem services, community-based landscape planning and how a community-based landscape planning process can be considered as a market situation of supply and demand. Chapter 3 describes the proposed method for the selection of stakeholders of ecosystem services, using insight from existing stakeholder analysis literature. After this, chapter 4 shows the application of the method on a case study in the Hoeksche Waard. The report ends with a discussion of the proposed method, including recommendations for application and future research.

2. Background

2.1 Ecosystem services; the link between landscape and human values

Ecosystems can be found at different spatial scales; ranging from a small pond to an ocean. Although people often associate ecosystems only with natural elements (Van der Heide & Sijtsma, 2011), ecosystems can also include cultural elements; people can be seen as an integral part of ecosystems. This also means that ecosystem services are not limited to purely natural areas. Ecosystem services can also to a certain extent be found in agricultural or urban areas. This study focuses on the provision of ecosystem services by green-blue networks (in Dutch: 'groenblauwe dooradering') in the landscape. Green-blue networks consist of linear and patchy landscape elements, running through rural and urban areas (Steingröver et al., 2011). Examples of such landscape elements are hedges, hedgerows, verges and brooks. An advantage of a focus on green-blue networks is its concrete spatial structure that can be found everywhere in the landscape; in intensively used agricultural landscapes as well as in multifunctional landscapes and in urban areas. Changing the characteristics of the green blue-network, like density of the network, surface of landscape elements or type of vegetation, causes changes in the present natural processes and components. These components and processes are not only the basis for a stable ecosystem; they also provide goods and services which contribute to human wellbeing (Oikonomou et al., 2011). Green-blue networks can provide several benefits to different actors at the same time, which can unite actors and facilitate landscape planning processes (Steingröver et al., 2011). The ability to serve different interests of different actors also makes green-blue networks especially suitable as focus of this research on stakeholders of ecosystem services.

In scientific literature, usually a distinction is made between ecosystem functions and services. Ecosystem functions can be described as the biological, chemical or physical interactions in an ecosystem (Van der Heide & Sijtsma, 2011), like photosynthesis or soil formation. There is no necessary direct link between ecosystem functions and people; ecosystem functions are also present without the existence of people. Ecosystem services are the result of these functions and can simply be defined as a set of ecosystem functions that are useful to humans (Herman et al., 2011; Kremen, 2005). Ecosystem services can be classified in several ways. Usually, services are classified into four categories, as described in the Millennium Ecosystem Assessment (2003):

- Provisioning services: physical products, e.g. food and fresh water;
- Regulating services: services derived from regulating processes in ecosystems, e.g. pollination, air quality regulation and erosion prevention;
- Cultural services: non-material services, like cultural heritage and identity, recreation and health;
- Supporting services: services needed for the production of all other ecosystem services, like soil formation and nutrient cycling.

As supporting services are not directly valued by people and can also be assessed as ecosystem functions, De Groot et al. (2010) propose to replace this category by habitat/support services, focusing more on the delivery of habitat for species and the maintenance of genetic diversity.

2.2 Community-based landscape planning

In the introduction it was already pointed out that a shift from state-led planning towards local, collaborative forms of planning is taking place in most democracies. In line with this trend, in this

study a community-based approach to landscape planning is assumed. Community-based planning can be explained as the active involvement of end users (or the local community) in planning activities (Wates, 2000). Increased community control of planning processes is assumed to lead to plans that better correspond to the local-context and local priorities (Lane & McDonald, 2005). Regarding a community-based approach to ecosystem management Gray et al (2001, p.21) state that "it builds on the premise that communities and ecosystems are interdependent and that communities, based on their proximity and vested interest, must play a key role in planning and implementing resource management activities, if those activities are to be sustainable on an ecological, social, and economic basis". In light of this premise, a community-based approach seems appropriate for landscape planning processes on a local to sub-regional scale focused on the delivery of ecosystem services.

Table 1 indicates that there are several levels of community involvement. The concept of community-based planning, as explained above, suggests a high level of community involvement in the form of partnership or self help. This study mainly focuses on the second level, at which authorities and community jointly work on planning and decision making. The main reason for this is that a process concerning ecosystem services requires a shift in thinking of people (Steingröver et al, 2011). Under the concept of ecosystem services, nature is considered as a production system that provides economic, social and ecological benefits to many actors. Being aware of these benefits and turning this awareness in a demand and subsequent action are therefore essential prerequisites for organizing a change in the landscape which is supposed to produce added value to its users. This way of thinking deviates from the view that nature merely should be conserved and protected because of its intrinsic value (Opdam and Wieringa, 2010). Besides this, in countries like the Netherlands, the government traditionally has a large role in nature and landscape conservation and development. Therefore, it can be assumed that a role of governmental or non-governmental organizations is still required in planning with ecosystem services, especially regarding the initiation of such a process.

Table 1: overview of different levels of community involvement at each project stage, taken from Wates (2000) (according to Wates, the shaded areas represent the levels at which community planning mostly operates and the dark area refers to the crucial ingredient of community planning)

		Project stages			
		Initiate ▸	Plan ▸	Implement ▸	Maintain
Level of community involvement	**Self Help** Community control	Community initiates action alone	Community plans alone	Community implements alone	Community maintains alone
	Partnership Shared working and decision-making	Authorities & community jointly initiate action	**Authorities & community jointly plan and design**	Authorities & community jointly implement	Authorities & community jointly maintain
	Consultation Authorities ask community for opinions	Authorities initiate action after consulting community	Authorities plan after consulting community	Authorities implement with community consultation	Authorities maintain with community consultation
	Information One way flow of information Public relations	Authorities initiate action	Authorities plan and design alone	Authorities implement alone	Authorities maintain alone

2.3 Landscape planning as a market situation of demand and supply

A community-based approach implies a process of planning and decision making based on deliberation and negotiation between various actors (Lane & McDonald, 2005). On the one hand, the process will include actors with an interest in certain developments and, on the other hand, there will be actors who can contribute to these developments. Community-based planning with ecosystem services will involve beneficiaries of ecosystem services and actors who can contribute to the production of these services by changing and managing the green-blue network. Realizing an adaptation of the landscape requires an exchange of values between the involved actors. Owners or manager of the green-blue network will bear the costs of the change and management of the network. Adaptation of the green-blue network will therefore reasonably involve a compensation from the actors benefiting from the delivered ecosystem services. Costs and benefits can be equalized in the form of financial or non-financial (e.g. exchange of goods or services) arrangements. As discussed before, such a community-based process can be considered as a market situation of supply and demand. Market in this sense is described as a place where ecosystem services are supplied and 'consumed'.

Steingröver et al (2011) describe how a market approach towards planning with ecosystem services could work in practice. What is clear is that the organization form will lie somewhere between a purely market approach and a government-led approach (also called hybrid governance structure). A free market is not realistic, mainly because ecosystem services can relate to both collective and private interests. Other reasons are the difficulty to express some ecosystem services in monetary terms, the occurrence of benefits on the longer term and the needed cooperation between land owners for effective production of many ecosystem services. Community-based planning with ecosystem services will therefore require a social network of demanders and suppliers who effectively collaborate and trust each other.

Demanders

Ecosystem services provide economic, sociocultural or ecological benefits to people. Because of these benefits, several people, companies or organizations may have an interest in the provision of services. These stakeholders are potential demanders of ecosystem services. However, interests in a certain ecosystem service are not always translated in a demand for that service (Steingröver et al., 2011). This is related to the different ways people can use or value ecosystem services. A part of ecosystem services is directly used by people by consumptive uses (e.g. harvesting of goods) or non-consumptive uses (e.g. enjoyment of scenic beauty) (TEEB, 2010). Other services are indirectly used by people. Examples are regulating services like flood protection and pollination. These kinds of ecosystem services are less obvious in the landscape and people may not be aware that they benefit from them (Van der Heide & Sijtsma, 2011). Beside this, services provided by an ecosystem can be valued by people without benefitting from it by direct or indirect use. In these cases ecosystem services are valued because of the option to use it, the intrinsic value or the importance for other people or future generations (TEEB, 2010).

Every stakeholder has its own interests, concerns and priorities and will therefore use or value ecosystem services in varying degrees. Benefits can occur on a short or long term and both private and public actors can have an interest in the provision of certain ecosystem services (Newcome et al., 2005). Beside this, potential demanders of ecosystem services can manifest themselves on different

spatial scales. Hein et al. (2006) state that “stakeholders at different scales often attach a different value to services, depending on their cultural background, and upon the impact of the service on their income and/or living conditions” (p.224). As an example, Hein et al. (2006) describe the situation in the Wieden wetlands in the Netherlands, where the ecosystem services provision of reed and fish serve as a source of income for local stakeholders. On a national scale level these two ecosystem services are of little importance. In this example, the main interest of national stakeholders is in the biodiversity conservation service of the area. As a green-blue network can provide multiple ecosystem services, related to different needs and interests on several spatial scales, this leads to a complex multilevel web of potential demanders.

Suppliers

Owners or managers of parts of the green-blue network can utilize the natural structures and processes in a way that ecosystem services are provided to themselves or to other stakeholders. These actors are potential suppliers of ecosystem services. Ecosystem services are generated on different spatial scales (Smit et al., 2012). Many ecosystem services can only be provided in the case of larger networks of landscape elements. This means that several suppliers have to collaborate in order to supply this kind of ecosystem services.

Figure 1 provides a schematic representation of the information described in this chapter.

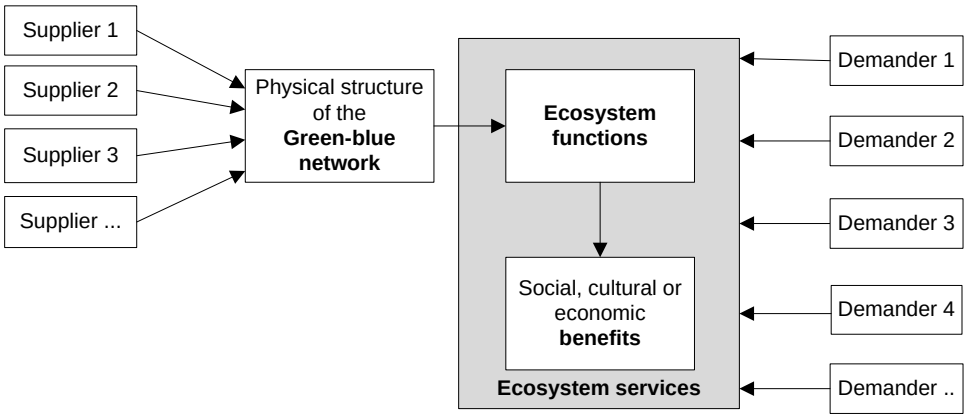

Figure 1: Schematic representation of the relations between ecosystem services and a green-blue network and the associated suppliers and demanders.

3. Method

In order to initiate a community-based process, relevant actors should be brought together. This requires insight into the actors who can act as a supplier or demander of ecosystem services. A high level of involvement at the same time means that, to ensure an efficient process, only a limited number of actors can be involved (Buono et al., 2012). Because of this, choices have to be made regarding who will be invited at the start of the process.

As mentioned in the introduction, the field of stakeholder analysis is quite diverse, consisting of various approaches and methods. Depending on the purpose and context a different focus, selection criteria and methods are required. Stakeholder approaches and methods are mainly developed in the fields of natural resource management, public policy and health policy, business management and development projects. Insights from these different disciplines are used for the development of a method focused on the concept of ecosystem services.

The method described in this chapter is intended to assist practitioners of governmental or non-governmental organizations in the identification and prioritization of potential demanders and suppliers of ecosystem services. Because of the focus on practitioners, the factors time and complexity are taken into account in the choice of stakeholder analysis methods. The techniques described in stakeholder analysis literature can be applied with or without active participation of stakeholders. In this study, it is assumed that the stakeholder analysis is done by the analyst, supported by one or a few people with local knowledge. This type of approach is mainly chosen, because of the various scales on which stakeholders of ecosystem services may manifest themselves and the advantages of this approach regarding time considerations.

Stakeholder analysis usually follows a series of steps. The definition of stakeholder analysis of Reed et al. (2009) is used to structure the stakeholder selection method in this research. They define stakeholder analysis as a process that 1) defines the aspects of a system under study, 2) identifies which individuals or groups are affected by or can affect these aspects and 3) prioritises these stakeholders for involvement in a decision-making process. This chapter is structured according to these three steps and especially focuses on application in a process of landscape planning concerning ecosystem services.

3.1 Selection of ecosystem services

Before stakeholders can be identified, insight is needed into the issue(s) under consideration. In this case, the identification of potential suppliers and demanders requires a selection of relevant ecosystem services. The relevance of ecosystem services in a certain area will depend on two factors: the land use pattern, which defines the services that can be produced (the potential supply), and the importance of ecosystem services for users of the area (the potential demand). This last factor relates to a difficult point that generally can be encountered in stakeholder analysis; the mutual relationship between issues and stakeholders (Prell et al., 2009). The issues determine the relevant stakeholders, and the stakeholders determine the relevant issues. Or in other words, if the issues are unknown, it is difficult to decide which stakeholders should be involved in defining the relevant issues (Dougill et al., 2006).

As a way to deal with this, I propose to consider the generic demand in an area. For example, the absence of arable farming makes a service like natural pest regulation less relevant. In this way, a list of ecosystem services can be shortened. Besides this, for each ecosystem service it has to be checked whether an improved production is achievable, based on the current or future characteristics of the landscape. In the end, this approach will result in a selection of relevant ecosystem services.

In addition to selecting ecosystem services, it might be possible to differentiate between the relevance of the selected services, especially if the central focus of the planning process is already predefined. The project 'Green City, Clean Waters' in the city of Philadelphia provides an example of such a situation. This project concerns the development of green infrastructure in order to manage stormwater runoff (Philadelphia Water Department, 2009). Although this green infrastructure at the same time delivers several other ecosystem services, the central focus was on water regulation. In this way, a distinction can be made between primary, secondary and, possibly, tertiary ecosystem services. This distinction between ecosystem services can be used in the prioritization of stakeholders.

3.2 Identification of stakeholders

3.2.1 Potential demanders

After the selection of ecosystem services, the potential demanders of these services can be identified. Ecosystems services and potential demanders are connected by the factor interest. Each ecosystem service provides one or more social, ecological or economic benefits. Several individuals, groups or organizations can have an interest in these benefits. These actors are the beneficiaries, or stakeholders, of the ecosystem service.

In this research, potential demanders are defined as the actors who benefit from the ecosystem service and actors who are committed to the conservation or improvement of the service. The former and the latter can differ in the sense that actors committed to the conservation or improvement of a service do not necessarily benefit themselves from an increased provision of the service; they can represent the interests of others. Although these actors might not profit from the ecosystem service in itself, they can profit from their role in the process of improvement, for example by increased prestige. Beneficiaries can live inside the study area, but may also come from outside the study area, like residents of nearby cities. More vague categories, like 'future generations' and 'wider society' are not included in this research, as these cannot act as demanders of ecosystem services. However, their stakes can be represented by present organizations or local individuals.

The connection of services and stakeholders requires identification of the benefits each ecosystem service can deliver at which spatial scale. In addition to this, insight is needed into the actors playing a role in the area and their goals and activities. By using this knowledge, it becomes possible to assign potential demanders for each ecosystem service. Potential demanders may have an interest in more than one ecosystem service. Besides positive benefits, possible negative benefits should also be taken into account. Although actors with a negative interest will not act as a demander, they can play an important role in the process.

A stakeholder-issue interrelationship diagram helps to visualize which stakeholders have an interest in which issues (Bryson, 2004); in this case, in which ecosystem services. The diagram also illustrates how different stakeholders may be related to each other by their interests in the issues (see figure 2).

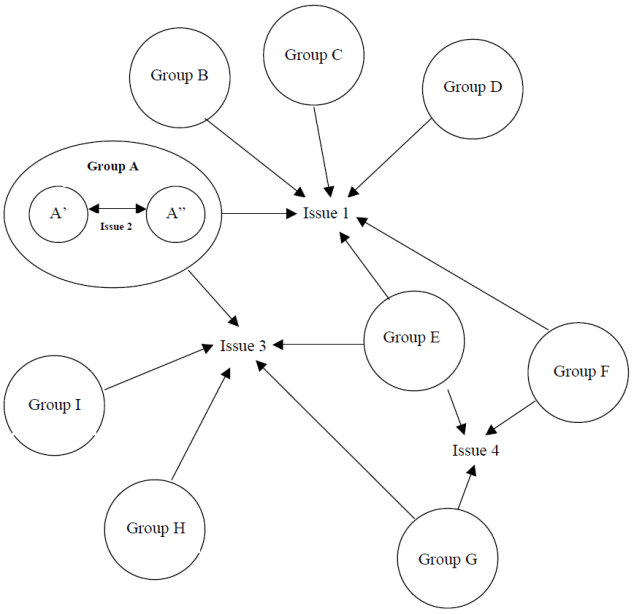

Figure 2: General structure of a stakeholder-issue interrelationship diagram, taken from Bryson (2004). In this study, the issues represent the selected ecosystem services

3.2.2 Potential suppliers

Besides the potential demanders, the potential suppliers of the selected ecosystem services can be identified. In this case, the connecting factor is the green-blue network needed to produce the selected services. Identification of potential suppliers requires insight in the type of landscape elements needed for the production of the selected services. In addition, information is needed about the landownership situation and management of this type of landscape elements in the study area. Potential suppliers can be defined as the land owners or managers of landscape elements that are part of the (current or future) green-blue network. In the same way as in the case of potential demanders, potential suppliers can be assigned for each ecosystem service and visualized in a stakeholder-issue interrelationship diagram.

3.3 Prioritization of stakeholders

3.3.1 Criteria for characterization of stakeholders

The identification of stakeholders is generally followed by the differentiation and categorization of stakeholders. Scientific literature about stakeholder analysis proposes several criteria for characterising and categorizing of stakeholders. A frequently cited article is the work of Mitchell et al. (1997) from the field of business management. These authors classify stakeholders based on three attributes: power, legitimacy and urgency. According to Mitchell et al. (1997) the degree of attention for different stakeholder claims is positively related to the number of attributes perceived to be present. Besides the work of Mitchell et al., several other criteria are mentioned in both scientific literature and literature with a more practical orientation. Despite of differing orientations and contexts of this literature, several criteria repeatedly emerge as classification criteria, including:

- The level of interest of a stakeholder in an issue;
- Attitudes of stakeholders towards a project;
- Power or influence;
- The degree of impact of an issue on a stakeholder.

Besides characteristics of individual stakeholders, also relations between stakeholders can be analysed. For example, potential conflicts and coalitions between stakeholders and their objectives can be defined (Fottler et al., 1989; Reed et al, 2009). In addition, Prell et al. (2009) describe how information generated by social network analysis can be used to select stakeholders for participation. They use social network analysis to identify the role and influence of stakeholders according to their positions in the stakeholder network. Information about influential and more peripheral stakeholders and the overall shape of the network can be considered when selecting stakeholders. Although social network analysis provides a deeper understanding of the relationships between stakeholders, Prell et al. (2009) advise to use it in conjunction with other methods or approaches to prevent too simplistic decisions about stakeholder involvement. A disadvantage of social network analysis is that it is time consuming and difficult to apply (Bourne and Weaver, 2010).

Despite of the common use of the above mentioned classification criteria, stakeholder literature generally does not provide a systematic approach regarding both the choice and use of these criteria (Luyet et al., 2012). The choice of criteria will depend on the context and objectives of the analysis (Grimble & Chan, 1995; Luyet et al., 2012). The following section elaborates on the choice and use of criteria for the characterization and prioritization of potential demanders and suppliers of ecosystem services.

3.3.2 Characterization of potential demanders and suppliers

For the purpose of this study, I already classified stakeholders in demanders and suppliers. However, it should be taken into account that potential suppliers themselves can also have an interest in ecosystem services and, therefore, can act as a demander. An example are arable farmers who contribute to natural pest control by the development of field margins. These arable farmers can benefit themselves from enhanced natural pest control.

It is possible to choose beforehand for a supply or demand-driven approach; starting the process with only one of the two groups. Both a supply and demand-driven approach is expected to have advantages and disadvantages. As explained before, community-based landscape planning requires exchange of values between supplying and demanding actors. Therefore, I propose an approach in which stakeholders in first instance are prioritized based on their characteristics, independent of their role as a potential supplier or demander.

Figure 3 shows the criteria that I consider relevant in the case of planning with ecosystem services. As mentioned above, the context and purposes of the analysis are leading in the choice of criteria. In this application, I consider as the main objective the realization of an effective process with the ultimate aim of developing the landscape to a state that better fulfils economical, ecological and social values. Normally, if effectiveness of a process is pursued, the primary consideration in the selection of stakeholders will be to include those stakeholders most likely to influence the advancement of the project or process, based on their interests, resources and influence (Grimble et al., 1995). For this reason, I decided to take the criteria “level of interest” and “level of power” as the main selection criteria.

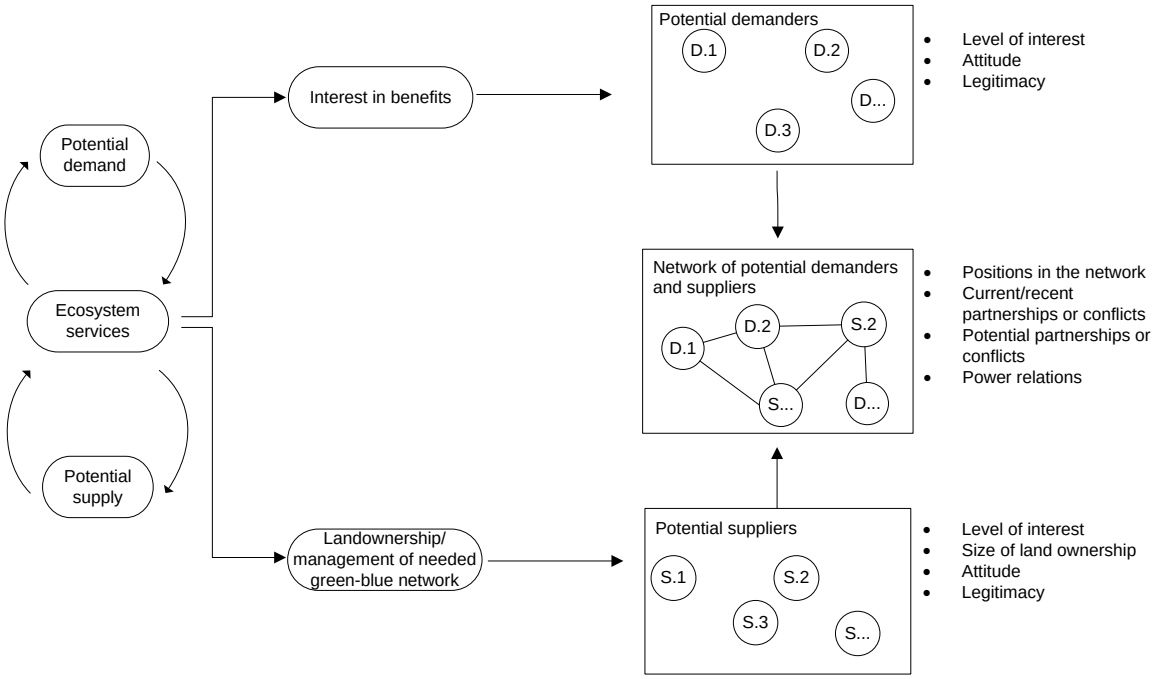

Figure 3: Overview of the first steps of the method and possible criteria for characterization of the (network of) potential demanders and suppliers (D stands for a potential demander and S for a potential supplier)

As mentioned above, there are no general rules on the use of criteria in stakeholder analysis literature. "The abstract factors are in most cases not connected to underlying factors that can be observed more easily and there are no clear cut procedures for assessing them" (Hermans, 2005, p. 24). However, using explicit criteria for making the assessment can help to prevent personal biases (Varvasovsky & Brugha, 2000). In the following sections, factors are described that are expected to influence the level of interest and power of potential demanders and suppliers. How these factors can be used to assign a value to the level of interest and power, becomes more clear in the application of this method in the next chapter.

Level of interest

Some stakeholder groups or organizations will have a larger interest in the provision of an ecosystem service than others. The level of interest will depend on several factors. First of all, the type of interest matters. Although there are often several stakeholders interested in the same ecosystem service, the types of interest of these stakeholders can differ. Possible types of stakes are, for example, economic dependency, dependency with respect to living circumstances, strategic reasons (e.g. achievement of (policy) objectives and prestige), and also moral considerations. Depending on the context and the selected ecosystem services, different types of interest can be distinguished. Some types of interest will result in a higher level of interest in the ecosystem services than others. For example, the relative interest of a stakeholder dependent on an ecosystem service for its income can be rated higher than interests of stakeholders related to recreational experience. The importance of each type of interest will highly depend on the specific circumstances. Besides the type of interest, the possible presence of alternatives for ecosystem services will influence the level of interest. This may involve spatial alternatives (e.g. in the case of recreational experience), but also, for instance, technical means that can replace an ecosystem services. The presence of alternatives that also can fulfil the needs of stakeholders may reduce their level of interest in ecosystem services.

Based on such "objective" criteria, the relative interest of stakeholder groups and organizations could be determined for each ecosystem service. This method does not concern how the actors themselves will rate their interest, as in that case additional factors will play a role, such as awareness of ecosystem services and people's world views and life styles (see e.g. Martín-López et al., 2012; Lamarque et al., 2011).

Level of power

Lots of different approaches to the concept of power can be found in the literature of social sciences. Power can be understood as a possession of somebody or an organisation; a possession that can be applied to reach a desired situation (e.g. Akbulut & Soylu, 2012). Others emphasize that power is not a possession, but a relation between people (Healy, 2003). Power can also refer to the actual exercise of power, present in all social relations as a mode to modify the actions of others (Foucault, 1980). In the literature of stakeholder analysis, power is generally understood as a possession of an individual or organisation. Stakeholders are commonly characterised by the expected amount of power they can exert in a process.

In this context, power is defined as the ability to influence the opinion and actions of others with respect to demanding or producing ecosystem services, in order to realize desired outcomes. Power resources will be unevenly distributed within a network of actors (Berger, 2003). Several authors have provided classifications of power resources in different types of disciplines. Sources of power are normally not considered in stakeholder literature. An exception is formed by Reed et al. (2009). These authors propose the use of three source of power defined by Galbraith (1983): personality, property and organisation. Derived from this contribution of Galbraith (1983) and French and Raven (1959), I consider the following power resources relevant in the case of planning for ecosystem services:

- **Formal authority,** or position power, got from the position in an organisation or society, often described in law or policy. Stakeholders with formal authority are qualified to take decisions with respect to other actors. In the case of planning for ecosystem services, this will hold for governmental organizations, which possess the right to formulate policies and regulations. Also, for example, large companies can utilize this power resource with respect to other, dependent stakeholders.
- **Possession of (financial) resources**. Every potential demander and supplier has to a certain extent access to this source of power, caused by the possibility to take part or abstain from the application of resources. An important resource of potential suppliers is the land ownership they can use, or refuse to use.
- **Personality**: the possession of certain characteristics that attract other actors, for example, reputation or charisma.
- **Possession of knowledge and skills.** Knowledge can refer to specific professional knowledge, but also to valuable local knowledge. An example of skills that can be applied to exert influence are negotiation skills.
- **Relationships with other actors**. This source of power is related to an actor's position in the network; the relationships with other actors who have access to certain power resources and the possibility to form partnerships.

The mentioned power resources are expected to be the most relevant to consider before the start of a process concerning ecosystem services. The possession of these power resources provides actors

the possibility to exert influence in the process and guide it in certain desired directions. It can be expected that during the process itself also other, more subtle, means of power are exerted, for example by the use of certain languages and the formation of certain discourses.

Just as in the case of relative interest, per ecosystem service the level of power of stakeholders can be defined.

Power-interest matrix

The power-interest matrix is a frequently used tool in stakeholder analysis to categorize stakeholders. After a rating is given of the estimated power and interest of a stakeholder, stakeholders are placed in a matrix in which the two dimensions are shown. Based on their level of interest and power, stakeholders are commonly divided into four groups and are labelled, for example, as key players, context setters, subjects and crowd (e.g. Eden and Ackermann, 1998).

A power-interest matrix can be made for each ecosystem service and provides insight into which stakeholders are most powerful and have the highest interest for each ecosystem service. The categorization of stakeholders based on level of power and interest forms the basis for the prioritization of potential demanders and suppliers. However, to improve the analysis, other criteria (e.g. existing partnerships or conflicts) can be added to this categorization, depending on the specific situation and the available knowledge about stakeholders.

3.3.3 Selection of stakeholder groups and organizations

The information of the power-interest matrix can be added to the two stakeholder-issue interrelationship diagrams, visualizing the most powerful and interested demanders and suppliers for each ecosystem service. Using these diagrams and the prioritization of ecosystem services, the most relevant stakeholder groups and organizations can be selected. For example, a conceivable approach would be the selection of all stakeholders of the primary ecosystem service(s), complemented by the most powerful and highly interested stakeholders of other ecosystem services. The amount of stakeholder groups and organizations selected for involvement will also depend on the available resources for the process and the desired group size.

Some potential demanders may have an interest in multiple ecosystem services, which increases their interest in the entire process. This is also something to consider when selecting stakeholder groups and organizations.

3.3.4 Selection of representatives

In the previous section, the organizations and groups of stakeholders who are expected to be most relevant at the start of the process are selected. However, the persons who will speak on behalf of these groups and organizations still have to be defined. Stakeholder analysis literature does provide little information about the choice of spokespersons for a group and about how unorganized people can be brought into the process (Billgren & Holmén, 2007). However, some insights can be drawn from the field of political science. Catt and Murphy (2003) mention four methods for selecting representatives of groups: random sampling, selection by government (in this case the stakeholder analyst) or the group itself, election, and self-appointment (i.e. individuals appoint themselves as representatives of a group). According to Catt and Murphy, the appropriateness of each method is dependent on the type of group in question and the purposes of involvement in the process.

In the context of this study, two types of stakeholder groups can be distinguished: organized groups, with an internal social network (e.g. a nature organisation), and more diffuse, unorganized stakeholder groups (e.g. inhabitants). In the first situation, the groups themselves can appoint their representatives, be it by election or in more informal ways. The second situation requires another method for selection of representatives. In the case of unorganized groups, I propose a method which involves the selection of spokespersons by the stakeholder analyst (in combination with informants). Selection by the analyst enables the choice of spokespersons with certain desired characteristics. I propose consideration of four criteria when selecting representatives of unorganized groups: representativeness, attitude, personality and knowledge and skills. In first instance, a spokesperson should be able to represent the interests of the stakeholder group, which requires representativeness, knowledge and certain skills with respect to participation and expression of views in a deliberative process. Secondly, spokespersons can be chosen who are expected to contribute most to the initiation of the process, based on their attitude and personality. Attitude in combination with personality can influence the opinion forming of other stakeholders and consequently the progress of the process. Below I give a short description of these four criteria.

Representativeness is the foremost criterion when selecting spokespersons from stakeholder groups. The concept of representativeness can have different meanings. In this context, representativeness means that the spokesperson should provide a good reflection of the opinion of the stakeholder group. Whether spokespersons really will provide an accurate representation of the opinion of the group cannot be guaranteed. However, consideration of the concept of representativeness in the selection of spokespersons may at least reduce the probability of misrepresentation.

Besides representativeness, certain **skills and knowledge** are required for a proper representation of the group's interests. Possession of skills and knowledge was also mentioned in section 3.3.2. as a possible sources of power. The person who speaks on behalf of the group especially needs skills regarding the expression of interests and the deliberation and negotiation with other stakeholders in the process. In addition, possession of local knowledge will contribute to a proper representation of the stakeholder group.

Representativeness and possession of knowledge and skills are preconditions when choosing spokespersons; spokespersons in first instance should meet these two criteria. In addition to this, I propose consideration of the criteria attitude and personality. In scientific literature **attitude** is defined as “tendencies to evaluate a particular entity, such as an action or an outcome, with some degree of favour or disfavour” (Eagly and Chaiken, 1993, p.1). In the context of this study, I translate this in two aspects of attitude. Firstly, attitude in relation to new (‘green’ or sustainability focused) initiatives in general. Secondly and more specifically, the attitude related to the development of green-blue networks to increase the production of ecosystem services. Whether this last aspect can be considered depends on the available information, but also on the novelty of this type of development for the involved actors. In the case of a completely new approach, the actors probably have not yet formed an attitude. The criterion of **personality** relates to the possession of certain characteristics that attract other actors, like reputation or charisma. Selecting people with a positive attitude, especially in combination with charisma or reputation, may contribute to the progress and effectiveness of the process.

3.3.5 Consideration of unselected stakeholders and ecosystem services

This stakeholder selection method will result in a selection of potential demanders and suppliers who will be involved at the start of the process. This selection can be complemented by some external actors, like scientists or field coordinators. The remaining potential demanders and suppliers will not be involved in the initiation of the process. As a consequence of this method, certain ecosystem services may not be represented by any stakeholder at the start of the process. Possible exclusion of ecosystem services would be caused by the absence of stakeholders with a high level of interest and power with respect to these services, in combination with a low rating of the priority of the ecosystem service. It is important to be aware of the possible exclusion of ecosystem services. Community-based landscape planning can be considered as joined learning process. New insights might appear during the process, which means that initially excluded ecosystem services and also the excluded potential demanders and suppliers might again become relevant in later process stages. Therefore I recommend explicit consideration of excluded ecosystem services and stakeholders as an evaluative step of the method (see figure 4).

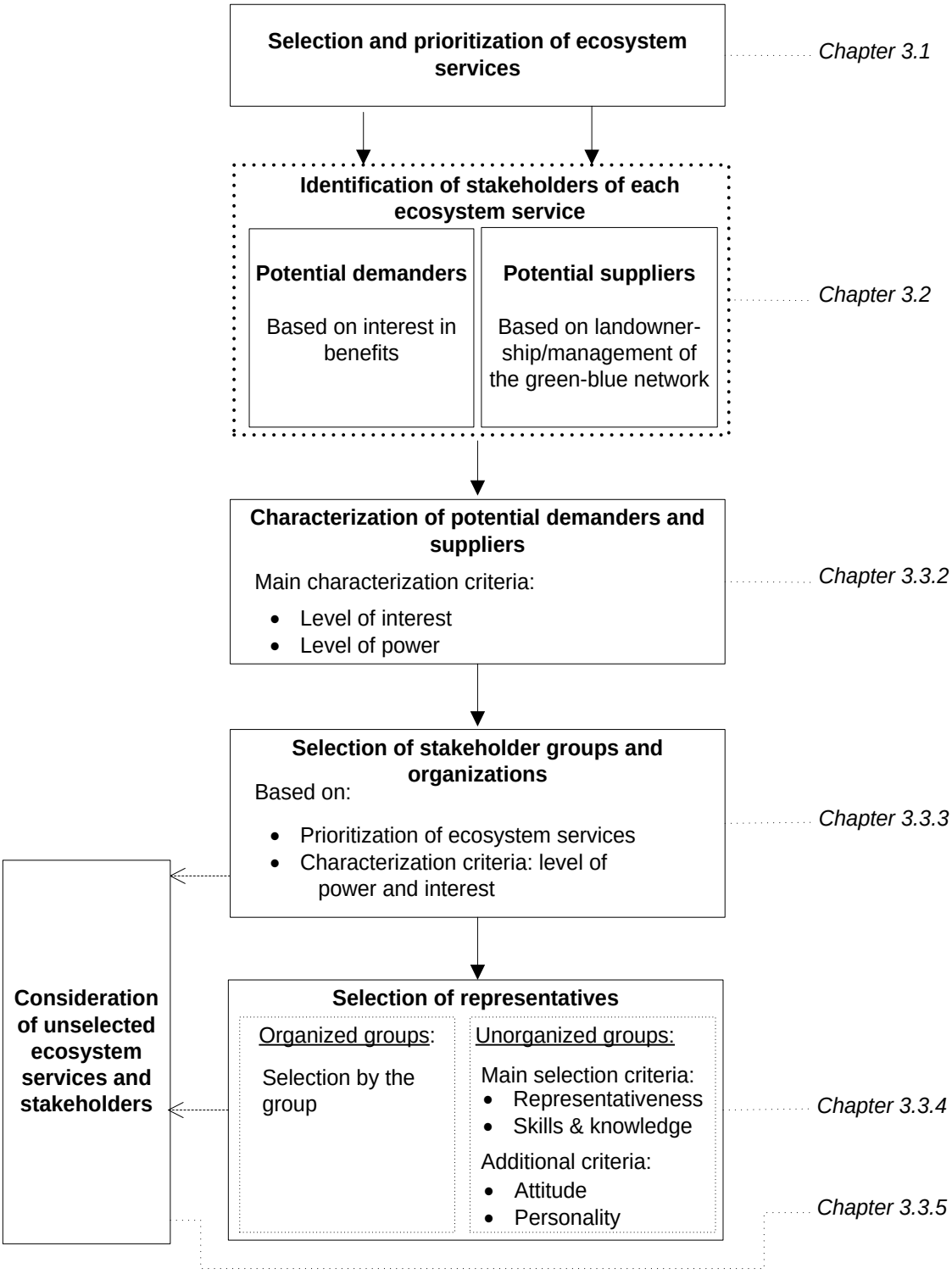

Figure 4: Schematic representation of the proposed steps of the stakeholder selection method, including references to the corresponding chapters in this report.

4. Application of the method

This chapter describes the application of the developed stakeholder selection method on a case study in the Hoeksche Waard. The Hoeksche Waard is an area of about 324 km^2, situated in the southwest of the Netherlands. The area is located south of an urban region including the city of Rotterdam and is surrounded by water courses. The landscape of the Hoeksche Waard is characterised by arable fields and a network of dikes and creeks (see fig. 5). The area has about 85.600 inhabitants, mostly living in one of the 14 small villages.

In 2004 an experiment was started in a part of the area concerning the development of a green-blue network that supports natural pest control (see e.g. Steingröver et al., 2010.) Information from this experiment, for example, about the present green-blue network, is utilized in the application of the stakeholder selection method. Because of time constraints, the method is applied by means of a desk-study; (policy) documents about the area and websites of stakeholders are consulted to get an overview of the stakeholders involved in the area and their characteristics. The application mainly serves to demonstrate the principles of the method and is not intended to provide an entirely accurate and complete overview of the stakeholder situation in the Hoeksche Waard.

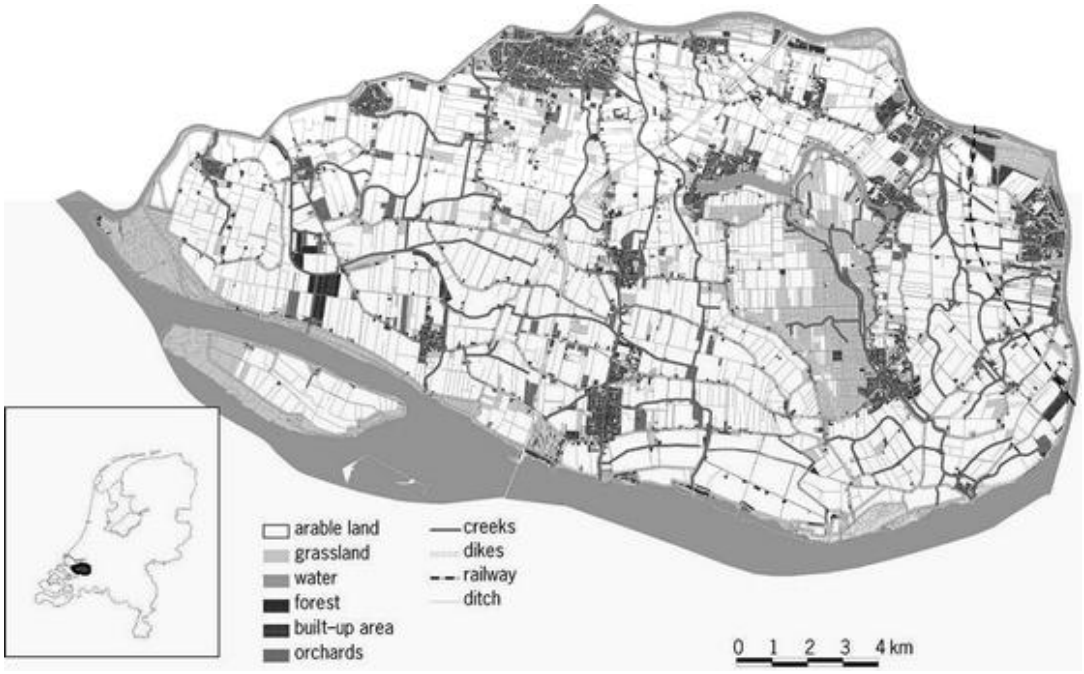

Figure 5: Overview of the study area and the location of the Hoeksche Waard in the Netherlands, taken from Steingröver et al. (2010)

4.1 Selection of ecosystem services

In chapter 3.1 is described how ecosystem services can be selected based on consideration of the potential demand and supply in an area. The project in the Hoeksche Waard was initiated in order to develop a green-blue network that supports natural pest control, with the intention to reach sustainable agricultural practices. The ecosystem service natural pest control is therefore the primary focus. However, an improved natural pest control and the required green-blue network can contribute to the supply of a number of other ecosystem services. Considering the potential demand (based on knowledge about the characteristics and use of the area), three other ecosystem services are considered relevant: surface water quality, biodiversity (the intrinsic value) and recreational experience and accessibility. In this case, these three services are of secondary importance (fig. 6).

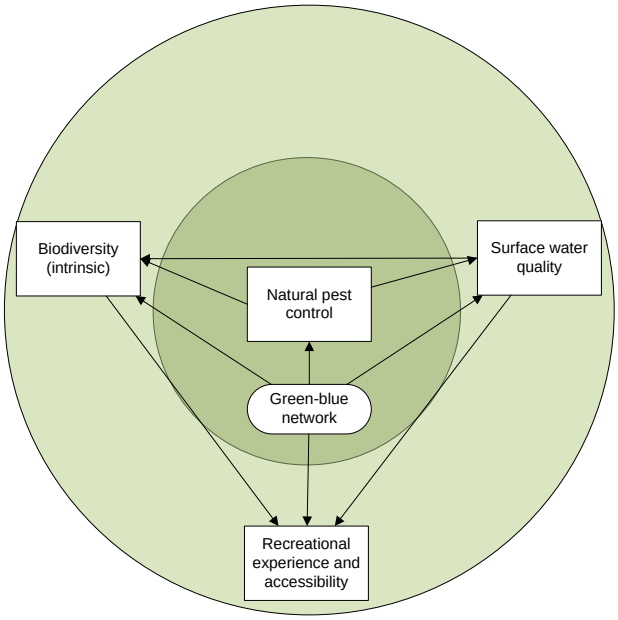

Figure 6: Overview of the selected ecosystem services, their interrelationships and relevance (in dark green the primary focus and in light green the services of secondary importance)

4.2 Identification of potential demanders and suppliers

4.2.1 Potential demanders

As described in chapter 3.2.1, connection of ecosystem services and potential demanders requires insight into benefits of the selected ecosystem services and an overview of the actors playing a role in the area and their objectives and activities. The considered benefits of each ecosystem service can be found in Appendix I. Based on an analysis of the area, a list is made of the groups and organizations playing a role in the area and their perceived objectives and activities. Using this information about actors, for each ecosystem services is analysed which actors may have an interest in the provided benefits. As an example, table A2 in Appendix I represents the objectives and activities of actors who are linked to the ecosystem service natural pest control. In this study, only direct interests (without the interposition of other ecosystem services) are taken into account. The results are visualised in a stakeholder-issue interrelationship diagram (see fig. 8).

4.2.2 Potential suppliers

Different types of landscape elements can be used to produce the four selected ecosystem services. For example, the service natural pest control can be supported by both robust (e.g. dikes and forest patches) and fine elements (e.g. field margins and verges of secondary roads) and both land- and water related-elements (e.g. ditch banks) (Steingröver et al., 2010). The same holds for the services biodiversity and recreational experience and accessibility. In the delivery of the service surface water quality only landscape elements situated along the watercourses will play a role.

The potential suppliers in the Hoeksche Waard are identified using the document '*Kwaliteitsimpuls groenblauwe dooradering voor natuurlijke plaagonderdrukking in de Hoeksche Waard*' (Geertsema et al, 2006). This document describes which actors own and manage landscape elements in the Hoeksche Waard. Table 2 gives an overview of the potential suppliers and the landscape elements they own and/or manage. All these actors can contribute to the production of the services natural pest control, biodiversity and recreational experience and accessibility. Potential supply of the service surface water quality is mainly limited to the Water board and farmers, who possess the

relevant pieces of land along the water courses. Because there is little difference between the potential suppliers per ecosystem service, a stakeholder-issue relationship diagram will in this case not assist in the selection of stakeholders.

Table 2: Overview of the potential suppliers and the landscape elements they own and/or manage

Potential supplier	Landscape elements
Water board Hollandse Delta	Dikes, creeks and verges
Five municipalities	Verges, elements within the villages
Province of Zuid-Holland	Verges of provincial roads
Staatsbosbeheer	Forest patches and creek banks
Natuurmonumenten	Grass- and reedland
Association Hoeksche Waards Landschap	Dikes and creeks (only management)
Rijkswaterstaat	Talus of the highway
ProRail	Embankments of the high speed line
Farmers	Field margins, vegetation on farmyards and ditch banks
Other private land owners (e.g. an insurer)	e.g. a sea bank

4.3 Prioritization of potential demanders and suppliers

4.3.1 Level of interest

The type of interest is taken as starting point for the assessment of the level of interest of stakeholders. For all identified stakeholders, their type of interests in the ecosystem service is assessed. Depending on the assumed relative importance, values are given to all types of interest. In this application, values are given on a scale of 1 (low) to 5 (high). Table 3 indicates the distinguished types of interest and their assumed relative importance in this application.

Table 3: The assumed relative importance of different types of interest in the case Hoeksche Waard

Type of interest	Relative importance
Economic dependency (income)	4-5
Compliance to regulations	4-5
Attractive living environment	4-5
Location specific advantages (companies)	3-4
Moral reasons	2-3
Achieving objectives and prestige	2-3
Keeping or attracting members	2-3
Leisure opportunities	1-2
Education	1-2

As mentioned in chapter 3.3.2, presence of alternatives for an ecosystem service also influences the level of interest of stakeholders. For example, the surrounding region of the study area provides several possibilities for recreational experience of recreational visitors, which decreases their relative interest in the provision of recreational experience and accessibility in the study area. Presence of alternatives is included by a decrease in the value of the level of interest.

Table A3 to A6 in Appendix II elaborate on the assessment of the level of interest of stakeholders per ecosystem services. The assigned values should be considered as relative values, indicating the level of interest of stakeholders relative to each other.

4.3.2 Level of power

By considering different sources of power, an estimation can be made of the extent to which a stakeholder will be able to exert influence. Possible sources of power are described in chapter 3.3.2. However, the question is how an overall estimation of the level of power of stakeholders can be derived from the assessment of the separate power resources. It can be assumed that access to multiple power resources will increase the level of power of stakeholders. Assessing stakeholder's power based on different power resources can be compared with the approach of Multicriteria Analysis; based on different types of criteria, alternative options (in this study stakeholders) are evaluated and compared. As in the case of Multicriteria Analysis, each power resource can be weighted differently. Depending on the situation, the importance of the power resources can differ.

In this application, the level of power of stakeholders is estimated based on only four sources of power: formal authority, land ownership, possession of financial resources and relationships with other actors. Considering all the sources of power mentioned in chapter 3.3.2 requires detailed information about the stakeholder situation in the Hoeksche Waard. In this application, the level of power is estimated 'at a distance', with limited information about the stakeholders. Furthermore, the sources personality and skills and knowledge are less applicable, because of the focus on stakeholder groups and organizations. In what way power resources are assessed will highly depend on the available information. Because of the limited knowledge in this application, the degree of access to the power resources is assessed using a simple ordinal scale for each of the power sources (no (0), little (+), moderate (++), much (+++)). In order to be able to aggregate the scores of stakeholders on the different sources, the ordinal scale is transformed into numbers, assuming a linear relationship between the scores (+++ becomes 3, ++ becomes 2, etc.). The factor land ownership is weighted twice as much as the other factors, because of the importance of landscape elements in the realization of the project. Without the collaboration of land owners nothing can be realized. Summation of the weighted scores on the different power sources, results in a relative indication of the level of power. This method of 'weighted summation' is a frequently used Multicriteria Analysis technique (Blom et al., 2002).

The calculations of the level of power of stakeholders of the different ecosystem services are included in Appendix III.

Power-interest matrix

The estimations of the level of interest and power are represented in matrices for each ecosystem services. As an example, figure 7 shows the matrix of the stakeholders of surface water quality. The power-interest matrices of the other three ecosystem services are included in Appendix IV.

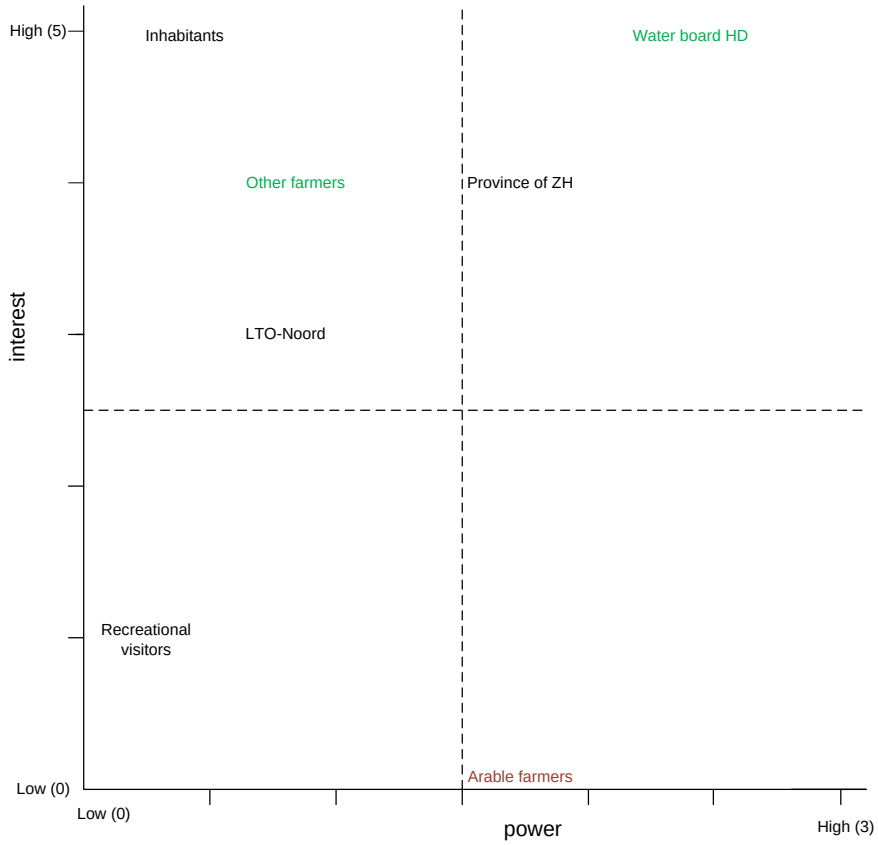

Figure 7: Power-interest matrix of stakeholders of surface water quality. The black stakeholders are potential demanders, red ones are potential suppliers and the green stakeholders are both potential supplier and demander.

4.3.3 Selection of stakeholder groups and organizations

Results of the previous steps, with regard to potential demanders, are visualized in figure 8. The identified potential demanders are linked to the ecosystem services of interest and are subdivided according to the priority of the ecosystem services (represented by the dark en light green circles, derived from figure 6). Besides this, the stakeholders with both a relatively high level of interest and a high level of power are highlighted. These are the stakeholders located in the upper right-hand part of the power/interest matrices. Figure 8 assists in the selection of relevant stakeholders groups or organizations, although it should be taken into account that the figure only represents potential demanders and potential suppliers who at the same time might act as demanders. It does not contain potential suppliers who themselves have no interests in the ecosystem services.

The priority of the ecosystem services in combination with the level of interest and power of stakeholders determine the choice of relevant stakeholder groups or organizations. Figure 9 shows how these criteria could be combined, resulting in a prioritization of the stakeholder groups and organizations in the Hoeksche Waard. The choice till which level of priority stakeholders are selected is also related to the available resources for the process and the desired group size.

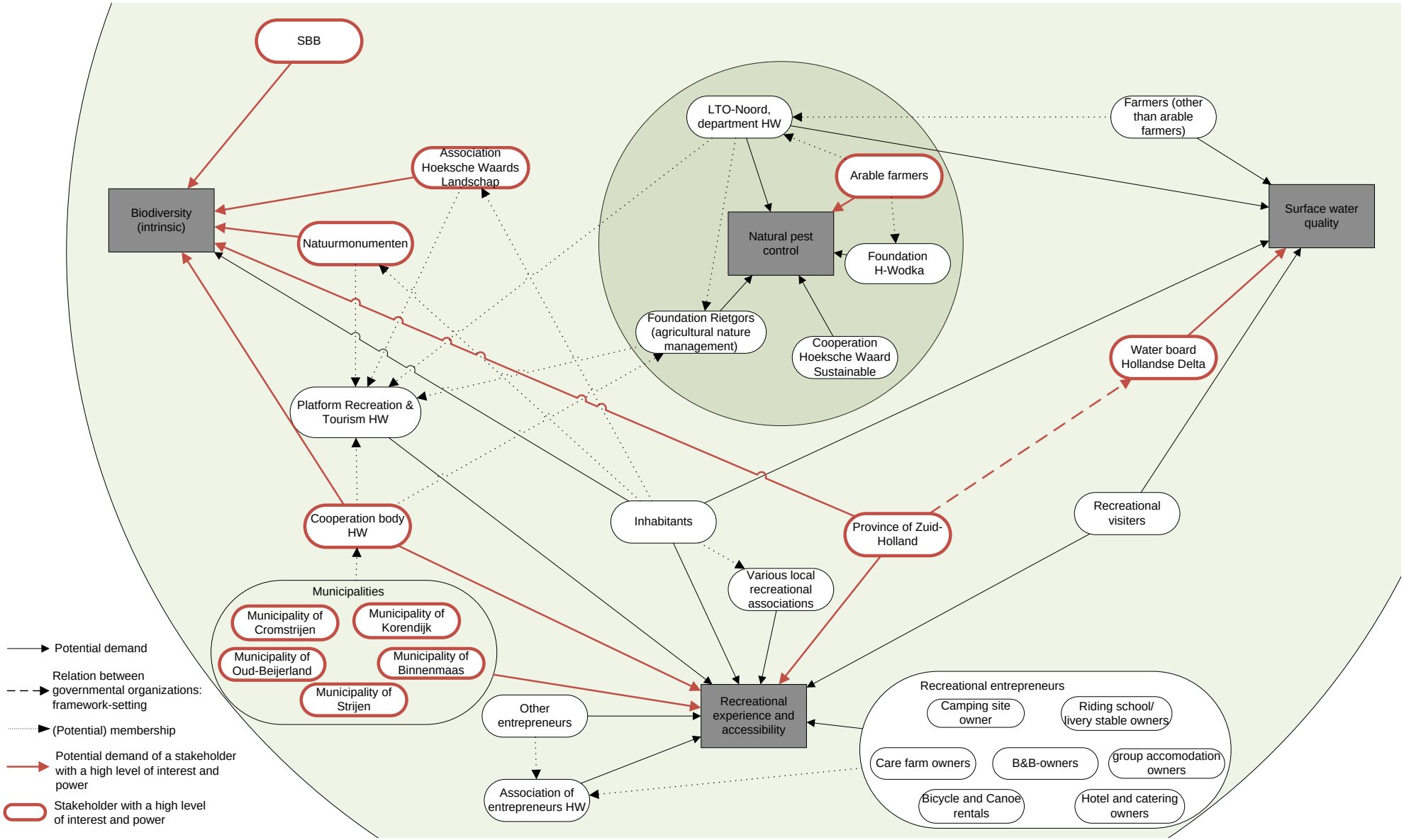

Figure 8: stakeholder-issue relationship diagram representing the results of the identification and characterization of potential demanders (HW stands for Hoeksche Waard)

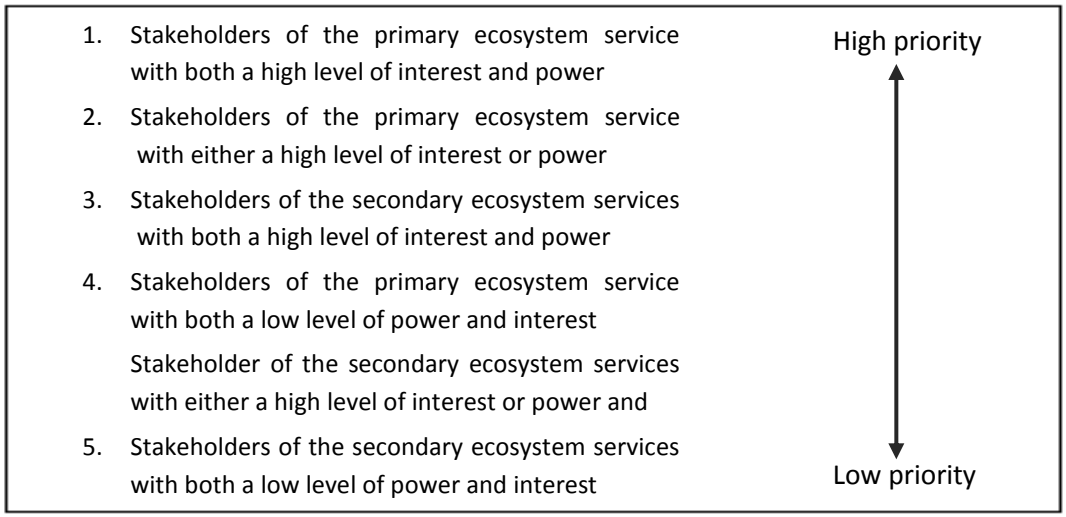

Figure 9: The assumed priority of stakeholder groups and organization in the Hoeksche Waard, based on the priority of ecosystem services and the level of interest and power

Figure 8 indicates that only arable farmers are both highly interested and powerful with respect to the ecosystem service natural pest control. Since natural pest control is the primary focus of the process, it would be appropriate to select also the other potential demanders and suppliers with a considerable interest or level of power (these are the stakeholders from the upper part and the lower right-hand part of the power/interest matrix).

The other three ecosystem services are of secondary importance. Therefore, it may suffice to select in first instance only the stakeholder groups or organizations with both a high level of power and interest with regard to these services. In that case, only the first three types of stakeholders from figure 9 are selected. However, as an additional consideration, attention can be given to the presence of both potential suppliers and potential demanders of each ecosystem service. As stated before, a community-based landscape planning process requires exchange of values between these two types of actors. In the case of the Hoeksche Waard, the actors with both a high level of power and interest are mainly actors who can both supply and benefit from the ecosystem services. Besides this, most of the potential suppliers of the secondary ecosystem services are already selected because of their role as a potential supplier of natural pest control. So if the selection in this application is limited to the first three types of stakeholders in figure 9, still each ecosystem service is represented by both potential suppliers and demanders.

Figure 8 indicates that several stakeholders groups and organizations may play multiple roles in the process. An example is the province of Zuid-Holland, which is assessed as a powerful and highly interested potential demander and also supplier of multiple ecosystem services. As mentioned in chapter 3.3.3, direct interests in multiple ecosystem services will increase the overall interest in the development of the green-blue network. For this reason, it would be proper to add inhabitants to the selection of stakeholders. Inhabitants have a relative low level of power, but a high level of interest in three of the ecosystem services.

Based on the considerations above, table 4 represents the proposed selection. This selection is based on the assumption that the first three types of stakeholders from figure 9 are selected. As mentioned before, this choice will in reality also be influenced by the available resources and the desired group size.

Table 4: The proposed selection of stakeholders groups and organizations

Selected stakeholder groups and organizations	
Arable farmers	Natuurmonumenten
LTO Noord, department Hoeksche Waard	Municipality of Cromstrijen
Foundation Rietgors	Municipality of Korendijk
Foundation H-Wodka	Municipality of Oud-Beijerland
Cooperation Hoeksche Waard Sustainable	Municipality of Binnenmaas
Water board Hollandse Delta	Municipality of Strijen
Province of Zuid-Holland	Cooperation body Hoeksche Waard
Association Hoeksche Waards Landschap	Inhabitants
Staatsbosbeheer	

Comparison with involved stakeholders in the real process

The next step of the method; the selection of representatives for involvement, is not performed in this case study. This last step requires more detailed information about the stakeholders. Despite of this, a comparison can be made between the proposed selection of stakeholder groups and organizations in this application and the groups and organizations that participated in the initiation of the process in the Hoeksche Waard in 2006 (see appendix V). This comparison has some limitations; new stakeholders have emerged (e.g. Cooperation Hoeksche Waard Sustainable, Natuurmonumenten and H-Wodka), others changed (e.g. Commission Hoeksche Waard became the Cooperation body Hoeksche Waard) and also the interests and level of power have somewhat changed due to a variety of developments. Besides this, some of the actors involved in the real process can be considered as external actors; actors who did not fulfil a role as potential suppliers or demander, but who were involved because of other reasons (e.g. consultancy firm DHV and the ministry of VROM).

Taking the changes in the stakeholder situation into account, it can be stated that a large part of the selected stakeholders in this application was also represented in at least one of the two workshops. The organizations LTO, Staatsbosbeheer and Cooperation body Hoeksche Waard were, however, only represented at the second workshop. Besides this, some organizations were quite overrepresented (e.g. the Water board and Rietgors), whereas other organizations were underrepresented (e.g. the municipalities). The lists of participants in table A11 and A12 do not tell something about the reason why these actors are invited. An actor like Staatsbosbeheer could be merely invited for its role as a potential supplier of natural pest control, but also for its interest in biodiversity, or both. It is known that the process in 2006 initially focused on the ecosystem service natural pest control and surface water quality as an additional service. The focus on these ecosystem services might be the cause of the overrepresentation and underrepresentation of certain actors, and also for the absence of inhabitants as a stakeholder group.

5. Discussion

This study aimed to develop a stakeholder analysis application for the identification and prioritization of potential demanders and suppliers of ecosystem services. The available literature about stakeholder analysis provides a diversity of methods and techniques for stakeholder analysis. However, there is little information about when, how and why these methods are effective (Reed, 2009; Bourne & Weaver, 2010). Clear is that in order to be effective, stakeholder analysis approaches have to be adapted to the specific circumstances and purposes of application. Related to this, stakeholder analysis is also seen as a "hands-on" theory, referring to the pragmatic use of stakeholder analysis theory (Billgren and Holmén, 2007). This study provides an application of stakeholder analysis focused on planning with ecosystem services. The application especially differs from other stakeholder analysis approaches by the assumption of a market approach with demanders and suppliers and the use of ecosystem services as multiple and clearly defined issues. The developed method is intended to assist practitioners in the initiation of processes focused on ecosystem services. In this sense, the study contributes to the application of the so far mainly scientific concept of ecosystem services in the practice of landscape planning.

In this chapter, the developed method is discussed in relation to the formulated research questions. The first part focuses on the identification of stakeholders and the second part elaborates on the characterization and prioritization of stakeholders. After this, the usability, analytical quality and utility of the method are discussed, using insights from the application in the Hoeksche Waard.

Identification of potential demanders and suppliers

Identification of potential demanders and suppliers requires insight into the relevant ecosystem services in the area. In the developed method, the ecosystem services are selected jointly by the analyst and a few people with knowledge about the local context. A disadvantage of this approach is that stakeholders are not involved in identifying the relevant issues. This disadvantage relates to the mutual relationship between stakeholders and issues; a difficulty generally encountered in stakeholder analyses (Prell et al., 2009). To prevent top-down identification of issues, Reed et al (2009) proposed an iterative approach, containing the possibility of feedback on chosen issues. When implementing this method, I recommend to include such a feedback loop. Integrating feedback in the process makes it possible for stakeholders to reflect on the chosen ecosystem services.

Potential demanders are related to ecosystem services by their interests in the social, ecological or economic benefits of the services. Connecting information about, on the one hand, the benefits of ecosystem services, and on the other hand, the perceived objectives and activities of actors, makes it possible to identify potential demanders for each ecosystem service. Within this study only direct interests in ecosystem services are taken into account. The occurrence of indirect interests relates to interrelationships between different ecosystem services. For example, the ecosystem service natural pest control positively contributes to surface water quality. However, in this study, the stakeholders of surface water quality are not assessed as potential demanders of natural pest control. Exclusion of indirect interests is in fact a simplification of reality. Indirect interests may influence, for example, the interrelationship between actors and the overall interest of an actor in the process. However, the question is also how far one should go in the consideration of indirect interests. I recommend this point to consider in future research.

Identification of potential suppliers is done by connecting information about the required green-blue network and information about land-ownership and management of natural or semi-natural elements in the area. Both potential suppliers and demanders are in first instance defined as groups of stakeholders or organizations. Groups of stakeholders can be differentiated based on different criteria. In this method, groups are differentiated if it is felt that their stakes in relation to the ecosystem services will significantly differ (e.g. arable farmers vs. other type of farmers in the case of natural pest control).

Characterization and prioritization of potential demanders and suppliers

Although characterization and prioritization were formulated as two distinct research questions, they are discussed together here. The reason for this is that the choice of characterization criteria already influences the prioritization of stakeholders.

Several criteria for characterization of stakeholders are mentioned in stakeholder analysis literature. A part of these criteria is applicable in the case of a stakeholder analysis related to ecosystem services. The choice of criteria for characterization depends on the purpose and the rationale behind the application of stakeholder analysis. Although a community-based approach in essence is based on normative considerations regarding the empowerment of local communities, effectiveness of the process is considered to be the primary concern in the developed stakeholder selection method. This means that those stakeholders most likely to affect the advancement of the process are considered to be most relevant.

The choice of level of power and interest as main selection criteria may seem contradictory to the assumption of a community-based planning process, since community-based planning is sometimes associated with inclusiveness of interests and community groups (e.g. Gray et al, 2001). The use of power as a criterion has been criticized for prioritizing only top-ranked, powerful stakeholders, which can lead to underrepresentation of the lower ranked groups in society (Prell et al., 2009). However, this criticism is based on a somewhat narrow view of the concept of power; associating power with hierarchical positions or formal authority. In the developed method I propose consideration of different sources of power, formal authority being just one of these. Factors like possession of knowledge and landownership also determine a stakeholders' capacity to exert influence in a process. Besides this, with respect to inclusiveness of interests, Prell et al. (2009) state that extensive involvement of a limited group of stakeholders will always entail a risk of a lack of representativeness.

It has to be taken into account that the proposed method only assists in the selection of stakeholders at the start of the process. Involvement of stakeholders and interests can change during the process as a result of new insights, but also because different stakeholders can be relevant at different process stages (Bourne and Weaver, 2010). This also means that, depending on the project stage, different characterization criteria may be relevant. Answering the question when which stakeholders are relevant in the process requires more research regarding, for example, relevant characterization criteria in different project stages.

As mentioned before, stakeholder literature provides little guidance on how to define the level of interest and power. This study tried to theoretically underpin the assessment by formulating underlying factors. In this way, this study contributes to a more informed assessment of the level of

interest and power. I recommend further research to test and further develop the assessment of interest and power based on underlying factors. Besides this, it should be taken into account that, although groups and organizations get one value for their estimated interest and power, in reality the level of power and interest can differ within a stakeholder group. Individual stakeholders will possess power resources in different degrees and their level of interest may differ due to a different degree of dependency on the ecosystem services and, for example, the distance to the delivered services. The occurrence of differences within groups is inevitable and consideration of each stakeholder individually would be practically unfeasible. However, stakeholder groups are distinguished based on significant differences in their stakes in ecosystem services. What is important is that this type of stake of the group is represented in the process. In this way, deliberation can take place based on the different types of stakes in the area. In the first phase of the process, differences in the relative interest and power within groups are therefore less relevant. The differences could, however, be relevant to consider in later process stages. The fact that some individual demanders or suppliers will profit, or can supply, more than others can, for example, play role if financial or non- financial agreements are made between suppliers and demanders.

In the developed method, the level of power and interest forms the basis for selecting stakeholders, combined with the prioritization of ecosystem services. Depending on the context and knowledge about the stakeholders, other criteria can be added to the categorization (e.g. the existing partnerships or conflicts). The method describes how visualization in the form of stakeholder-issue interrelationship diagrams and power-interest matrices assist in the selection of relevant stakeholder groups and organizations. After the step of selection of relevant stakeholder groups, another step is distinguished in which the persons who will represent these groups and organizations are chosen. Since this last step receives little attention in stakeholder analysis literature, assumptions are made regarding proper ways to select spokespersons. Two types of stakeholder groups are distinguished: organized groups, who can appoint their own spokespersons, and unorganized groups. In the latter case, it is proposed to select spokespersons based on representativeness and knowledge and skills, with the criteria attitude and personality as additional considerations.

Just like the feedback on selected ecosystem services, I recommend discussion of the selection of stakeholders with the involved stakeholders. Being transparent about the used criteria makes it possible for involved stakeholders to verify and reflect on the identified and selected stakeholders. In this way, other stakeholders can be added to the network of actors during the process. It should also be taken into account that a stakeholder analysis only provides a snapshot of the stakeholder situation (Varvasovsky and Brugha, 2000). The present stakeholders and their characteristics are subject to change and can also change during the process. Dynamics in the stakeholder situation indicate the need for on-going reflection on the involved stakeholders during the process.

Practicality, analytical quality and utility of the method

Hermans (2005) criticizes stakeholder analysis procedures for lacking an underlying theoretical framework. Or as he states: "the analytical core of the stakeholder analysis methods consists of different tables or “laundry lists” of items that are neither clearly connected to each other, nor to underlying theory or real-world observations" (p. 43). In this study, this lack of an analytical core was mainly encountered in the use of the criteria power and interest. The lack of a theoretical framework increases the risk of personal bias and a lack of consistency (Hermans, 2005). There are other approaches related to actor analysis with a more profound theoretical basis. One of them, social

network analysis, was already mentioned before. The application of these approaches will increase the analytical quality. However, their application is relatively complex and time consuming, which makes them less suitable for application by practitioners. Instead of choosing more complex approaches or techniques, this study attempted to improve the analytical quality of existing methods of stakeholder analysis, like the power/interest matrix, by connecting them to underlying factors. In this way, it is tried to find a balance between practicality and analytical quality.

In the end the question is whether the developed stakeholder selection method will actually contribute to a better process. Without the application of stakeholder analysis, stakeholders are often identified and selected on a more intuitive basis, with a risk of excluding important stakeholders and reduced support of the process (Reed et al., 2009). The application in this research had too many restrictions, for example regarding the used information, to get insight into the actual workability and utility of the method. However, the application at least makes clear that the method leads to a more systematic consideration and selection of stakeholders. The method helps to get insight into the different roles actors can play as a demander and/or supplier of different ecosystem services. The question how the success of a community-based planning process depends on the selection of stakeholders is an interesting point for future research. Investigation of the relationship between success of a process and stakeholder selection requires a transparent method to make this selection of stakeholders. In this sense, the developed method contributes to a methodology required for improved understanding of planning processes.

In summary, I first of all recommend testing of the method in real situations. When implementing the method, I advise to integrate feedback possibilities in the process. Points of attention to consider in future research are the issue of indirect interests, the rating of power and interest based on underlying factors, and the relevance of characterization criteria in different process stages. Finally, the method can be used to study how outcomes of planning processes depend on stakeholder selection.

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Appendices

Appendix I - Background information for identification of potential demanders

Table A1: Considered benefits of the four selected ecosystem services, used in the identification of potential demanders of ecosystem services in the Hoeksche Waard. The italic benefits refer to the provision of other ecosystem services.

Ecosystem service	Possible benefits
Natural pest control	- Cost savings on the use of artificial pesticides; - Improvements regarding the societal image of farmers; - *Improved water quality;* - *Enhancement of biodiversity.*
Biodiversity (intrinsic)	- Presence of plants and animals. People can value these for their intrinsic value; - Fulfilling the moral duty (people can feel) to conserve nature.
Surface water quality	- Governmental organizations can fulfil requirements imposed from above (related to the European Water Framework Directive); - Improved living environment for residents; - Improved circumstances for recreational users of the water; - Water of improved quality for extraction of water; - *Improvement of the ecological quality of the water system (enhanced biodiversity).*
Recreational experience and accessibility	- Enhanced attractiveness of the area for open air recreation; - A higher income for entrepreneurs related to the recreational sector; - Increased employment in the recreational sector.

Table A2: As an example, an overview of the objectives and activities of actors who accordingly are linked to the ecosystem service natural pest control.

Actor	Objectives & activities
Arable farmers	Arable farmers in general aim for a healthy arable farm, in first instance in economic terms, but potentially also in the sense of environment and landscape (this can influence their societal image).
LTO Noord, department Hoeksche Waard	LTO Noord (LTO stands for Agriculture and Horticulture Organization) aims to look after the economic and societal interest of her members: entrepreneurs in the agriculture and horticulture sector. The same applies for LTO Noord, department Hoeksche Waard, but then focused on the local scale level of the Hoeksche Waard (LTO Noord afdeling De Hoeksche Waard, 2012)
Foundation Rietgors	Rietgors is a foundation focused on agricultural nature management in the Hoeksche Waard. Rietgors aims to maintain and strengthen the agricultural and landscape qualities of the Hoeksche Waard. According to foundation Rietgors, the foundation fulfils a function as link between farmer and nature and between farmer and government. (Stichting Rietgors, 2012)
Cooperation Hoeksche Waard Sustainable	Cooperation Hoeksche Waard contains a number of working groups focused on different themes related to sustainability. One of these is

	the working group 'Resources, biodiversity and consumer'. This working group, among other things, intends to reduce the use of pesticides and to stimulate the use of field margins (Hoeksche Waard Duurzaam, 2011).
Foundation H-Wodka	By means of innovation, H-Wodka aims to improve the vitality of arable farming and, at the same time, to provide conditions for preservation or development of landscape values in the Hoeksche Waard. (H-Wodka, 2006)

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Appendix II - Assessment of the level of interest

Table A2 to A5 elaborate on the assessment of the level of interest of potential demanders of each ecosystem service. The types of interest and, if applicable, the presence of alternatives are shown for each potential demander. Using the framework of table 3 (included in the main body of text), this information results in a relative score of the relative interest on a scale of 0 (low) to 5 (high).

Table A3: Assessment of the level of interest of stakeholders of natural pest control

Natural pest control			
Actors	Type of interest	Presence of alternatives	**Level of interest**
Potential demanders			
LTO Noord, department Hoeksche Waard	achieving objectives and prestige; keeping or attracting members	-	3
Foundation Rietgors	achieving objectives, possibly also prestige	-	3
Foundation Hoeksche Waard op de Kaart (H-WodKa)	achieving objectives, possibly also prestige	-	3
Cooperation Hoeksche Waard Sustainable (HWD)	achieving objectives, possibly also prestige; keeping or attracting members	-	3
Both potential demander and supplier			
Arable farmers	economic dependency, prestige (societal image)	Yes, in the form of artificial pesticides (although probably accompanied by higher costs and a worse image)	5

Table A4: Assessment of the level of interest of stakeholders of surface water quality

Actors	Type of interest	Presence of alternatives	Level of interest
Potential demanders			
LTO Noord, department Hoeksche Waard	achieving objectives and prestige; keeping or attracting members	-	3
Province of Zuid-Holland	compliance to regulations, achieving objectives and prestige	-	5
Inhabitants	attractive living environment	-	4
Recreational visitors (water-related)	Leisure opportunities	There are water-related leisure opportunities	1
Both potential demanders and suppliers			
Farmers, other than arable farmers	economic dependency	Lower quality water/artifical supply of water	4
Water board Hollandse Delta	compliance to regulations, achieving objectives	-	5

Table A5: Assessment of the level of interest of stakeholders of biodiversity (intrinsic)

Actors	Type of interest	Presence of alternatives	Level of interest
Potential demanders			
Inhabitants	attractive living environment , moral reasons	-	4
Cooperation body Hoeksche Waard (SOHW)	achieving objectives and prestige	-	3
Both potential supplier and demander			
Province of Zuid-Holland	achieving objectives and prestige (responsible for nature policy)	-	3
SBB	achieving objectives and prestige	-	3
Natuurmonumenten	achieving objectives; moral reasons and keeping or attracting members	-	3
Hoekschewaards Landschap (HWL)	achieving objectives; education, moral reasons and keeping or attracting members	-	3

Table A6: Assessment of the level of interest of stakeholders of recreational experience and accessibility

Actors	Type of interest	Presence of alternatives	Level of interest
Potential demanders			
Recreational entrepreneurs	economic dependency		5
Inhabitants	attractive living environment; leisure opportunities and possibly economic interests (real estate appreciation)	There are relatively little opportunities for recreation in the rural area of the Hoeksche Waard	5
Local recreational associations	leisure opportunities; keeping or attracting members		3
Recreational visitors (from outside the area)			
water-related	leisure opportunities	There are other recreational possibilities in the region, both terrestrial and water-related	1
terrestrial	leisure opportunities		1
Entrepreneurs	Location specific advantages	-	3
Association of entrepreneurs in the Hoeksche Waard	achieving objectives; keeping or attracting members	-	2
Cooperation body Hoeksche Waard (SOHW)	achieving objectives and prestige	-	3
Platform Recreation and Tourism	achieving objectives	-	3
Both potential demander and supplier			
Province of Zuid-Holland	achieving objectives and prestige	-	3
Municipality of Binnenmaas	achieving objectives and prestige	-	3
Municipality of Cromstrijen	achieving objectives and prestige	-	3
Municipality of Korendijk	achieving objectives and prestige	-	3
Municipality of Oud-Beijerland	achieving objectives and prestige	-	3
Municipality of Strijen	achieving objectives and prestige	-	3

Appendix III - Assessment of the level of power

Table A6 to A9 clarify the assessment of the level of power of stakeholders for each selected ecosystem service. The tables show the 'scores' of stakeholders on the different sources of power. The scores are represented in the form of numeric values (0-3), as described in chapter 4.3.2. Summation of the weighted scores on the different power sources results in an indication of the level of power on a scale of 0 (low) to 3 (high).

Table A7: Assessment of the level of power of stakeholders of natural pest control

	Power resources				
	Formal authority	Land ownership	Possession of financial resources	Relationships with other actors	***Level of power***
Weighting	0,2	0,4	0,2	0,2	
Actors					
Potential demanders					
LTO Noord, department Hoeksche Waard	0	0	1	3	0,8
Foundation Rietgors	0	0	1	3	0,8
Foundation Hoeksche Waard op de Kaart (H-WodKa)	0	0	1	1	0,4
Cooperation Hoeksche Waard Sustainable (HWD)	0	0	1	2	0,6
Both potential demander and supplier					
Arable farmers	0	3	1	1	1,6
Potential suppliers					
Other farmers	0	1	1	1	0,8
Water board Hollandse Delta	0	3	2	1	1,8
Municipality of Binnenmaas	3	1	2	2	1,8
Municipality of Cromstrijen	3	1	2	2	1,8
Municipality of Korendijk	3	1	2	2	1,8
Municipality of Oud-Beijerland	3	1	2	2	1,8
Municipality of Strijen	3	1	2	2	1,8
Province of Zuid-Holland	3	2	3	1	2,2
Rijkswaterstaat	0	1	2	1	1,0
ProRail	0	1	2	1	1,0
Hoekschewaards Landschap (HWL)	0	2	1	3	1,6
SBB	0	3	1	1	1,6
Natuurmonumenten	0	2	1	2	1,4

Table A8: Assessment of the level of power of stakeholders of water surface quality

	Power resources				
	Formal authority	Land ownership	Possession of financial resources	Relationships with other actors	***Level of power***
Weighting	0,2	0,4	0,2	0,2	
Actors					
Potential demanders					
LTO Noord/department Hoeksche Waard	0	0	1	3	0,8
Inhabitants	0	0	1	1	0,4
Province of Zuid-Holland	3	0	3	2	1,6
Recreational visitors (water-related)	0	0	1	0	0,2
Both potential demanders and suppliers					
Other farmers	0	1	1	1	0,8
Water board Hollandse Delta	3	3	2	1	2,4
Potential supplier					
Arable farmers	0	3	1	1	1,6

Table A9: Assessment of the level of power of stakeholders of biodiversity (intrinsic)

	Power resources				
	Formal authority	Land ownership	Possession of financial resources	Relationships with other actors	***Level of power***
Weighting	0,2	0,4	0,2	0,2	
Actors					
Potential demanders					
Inhabitants	0,0	0,0	1,0	1,0	0,4
Cooperation body Hoeksche Waard (SOHW)	3,0	0,0	3,0	3,0	1,8
Both potential supplier and demander					
Province of Zuid-Holland	3,0	2,0	3,0	1,0	2,2
SBB	0,0	3,0	1,0	1,0	1,6
Natuurmonumenten	0,0	3,0	1,0	2,0	1,8
Hoekschewaards Landschap (HWL)	0,0	2,0	1,0	3,0	1,6
Potential suppliers					
Arable farmers	0,0	3,0	1,0	1,0	1,6
Other farmers	0,0	1,0	1,0	1,0	0,8
Water board Hollandse Delta	0,0	3,0	2,0	1,0	1,8
Rijkswaterstaat	0,0	1,0	2,0	1,0	1,0
ProRail	0,0	1,0	2,0	1,0	1,0
Municipality of Binnenmaas	2,0	1,0	2,0	2,0	1,6
Municipality of Cromstrijen	2,0	1,0	2,0	2,0	1,6
Municipality of Korendijk	2,0	1,0	2,0	2,0	1,6
Municipality of Oud-Beijerland	2,0	1,0	2,0	2,0	1,6
Municipality of Strijen	2,0	1,0	2,0	2,0	1,6

Table A10: Assessment of the level of power of stakeholders of recreational experience and accessibility

	Power resources				
	Formal authority	Land ownership	Possession of financial resources	Relationships with other actors	***Level of power***
Weighting	0,2	0,4	0,2	0,2	
Actors					
Potential demanders					
Recreational entrepreneurs	0	0	3	1	0,8
Inhabitants	0	0	1	1	0,4
Local recreational associations	0	0	1	1	0,4
Recreational visitors (from outside the area)					
water-related	0	0	1	0	0,2
terrestrial	0	0	1	0	0,2
Other entrepreneurs	1	0	3	1	1,0
Association of entrepreneurs in the Hoeksche Waard	0	0	1	3	0,8
Cooperation body Hoeksche Waard (SOHW)	3	0	3	3	1,8
Platform recreation and tourism	0	0	1	3	0,8
Both potential demander and supplier					
Province of Zuid-Holland	3	2	3	1	2,2
Municipality of Binnenmaas	3	1	2	3	2,0
Municipality of Cromstrijen	3	1	2	3	2,0
Municipality of Korendijk	3	1	2	3	2,0
Municipality of Oud-Beijerland	3	1	2	3	2,0
Municipality of Strijen	3	1	2	3	2,0
Mogelijke suppliers					
Arable farmers	0	3	1	1	1,6
Other farmers	0	1	1	1	0,8
Water board Hollandse Delta	0	3	2	1	1,8
Rijkswaterstaat	0	1	2	1	1,0
ProRail	0	1	2	1	1,0
Hoekschewaards Landschap (HWL)	0	2	1	3	1,6
SBB (nationaal landschap)	0	3	1	1	1,6
Natuurmonumenten	0	3	1	2	1,8

Appendix IV - Power-interest matrices

Stakeholders in black are potential demanders, red represents potential suppliers and the green stakeholders are both potential supplier and demander.

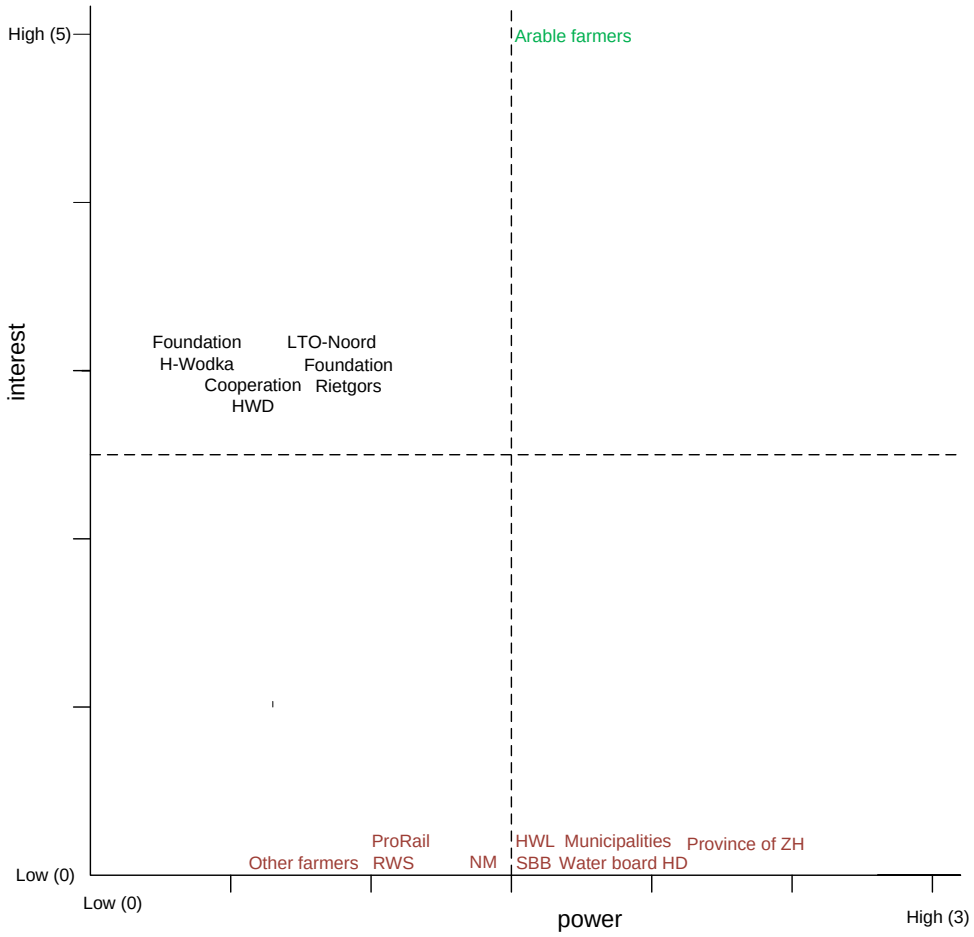

Figure A1: Power-interest matrix showing the level of interest and power of stakeholders of natural pest control

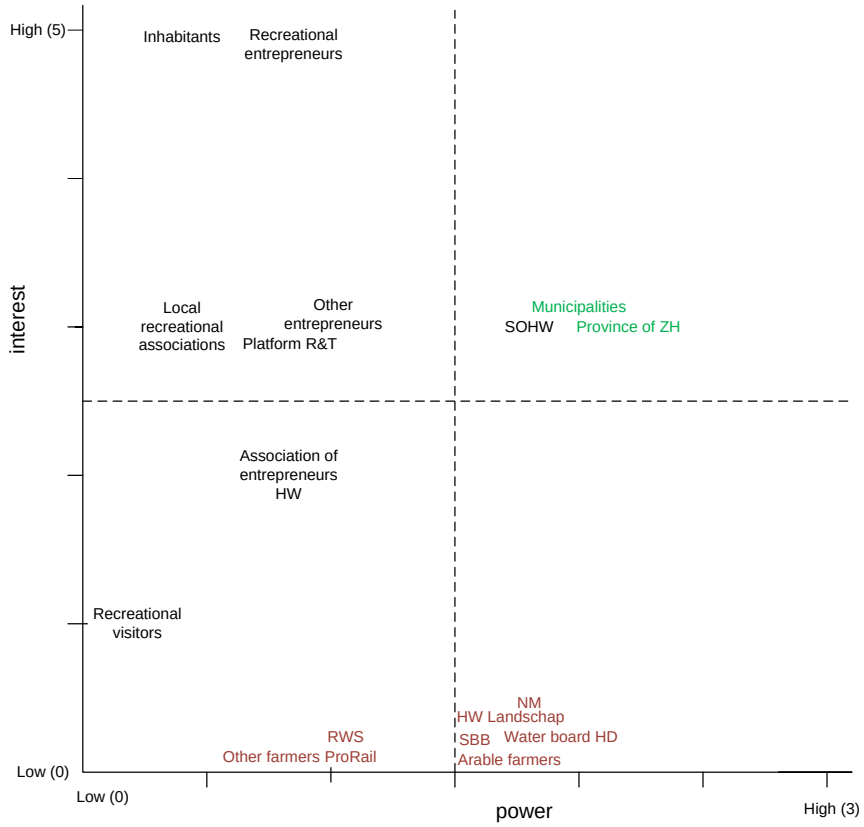

Figure A2: Power-interest matrix showing the level of interest and power of stakeholders of recreational experience and accessibility

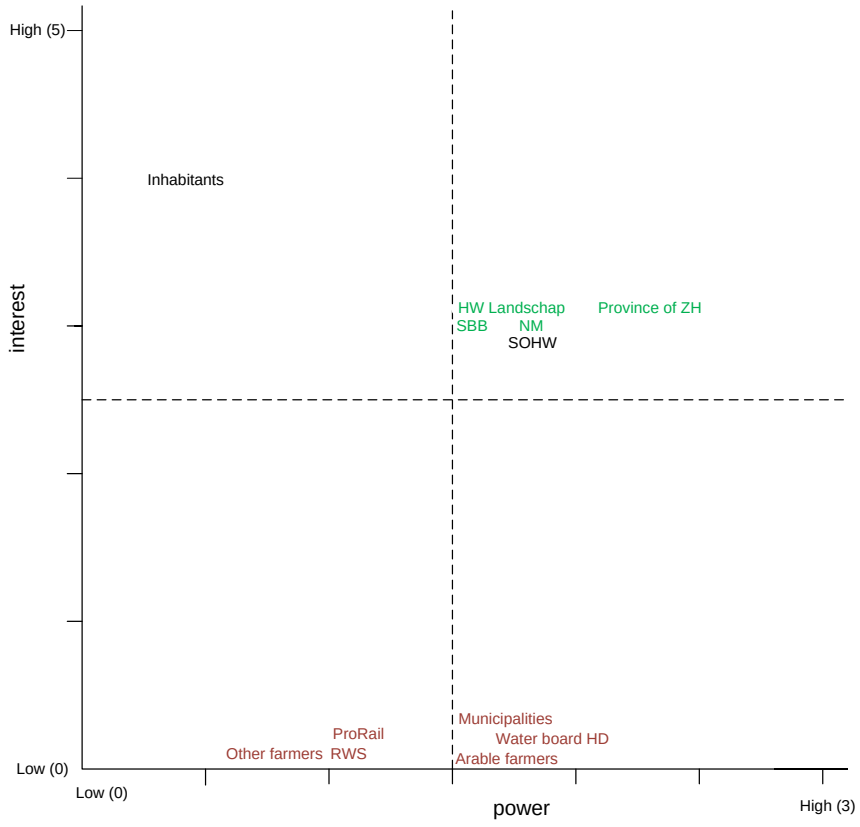

Figure A3: Power-interest matrix showing the level of interest and power of stakeholders of biodiversity (intrinsic)

Appendix V - Stakeholders involved in the process in the Hoeksche Waard

In 2006 a process was initiated with the aim to develop a green-blue network that supports natural pest control. Two consecutive workshops were held with involved actors. These actors were selected on an intuitive basis. Table A10 en A11 show the participants of the two workshops.

Table A11: Participants of the first workshop *(source: Geertsema et al, 2006)*

Participants
ANV Rietgors (2 representatives)
Arable farmer
Association Hoeksche Waards Landschap (2 representatives)
Delta Natuurbeheer Cooperation
Ministry of VROM (2 representatives)
Municipality of Strijen
PPO (applied plant research) (2 representatives)
Province of Zuid-Holland
Water board Hollandse Delta (6 representatives)

Table A12: Participants of the second workshop *(source: Geertsema et al, 2006)*

Participants
ANV Rietgors
Arable farmer (LTO)
Association Hoeksche Waards Landschap
Commission Hoeksche Waard
DLV (consultancy firm)
LTO
Ministry of VROM (2 representatives)
ProRail
Province of Zuid-Holland
Staatsbosbeheer
Water board Hollandse Delta (3 representatives)

Reference

Geertsema, W., Steingröver, E., Van Wingerden, W.K.R.E., Spijker, J., Dirksen, J. (2006) *Kwaliteitsimpuls groenblauwe dooradering voor natuurlijke plaagonderdrukking in de Hoeksche Waard*, Wageningen: Alterra, report 1334.