

## Article

# Knowing Me, Knowing You—Capturing Different Knowledge Systems for River Landscape Planning and Governance

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**Abstract:** Navigating the evolution of river landscapes towards more sustainable pathways requires transdisciplinary research including diverse stakeholders. A thorough understanding of stakeholder interests, including potential conflicts and options for convergence, is critical for the design and implementation of such transdisciplinary research. So far, only a few studies have conducted in-depth stakeholder analyses. The aim of this paper is to elucidate and characterize the interests of the relevant actors in a case study for sustainable river landscape development in Germany. The research questions concern the (i) commonalities and differences as manifested in the structures of thought and action of the actors, and the (ii) potential points of conflict or convergence of interests, as relevant for further transdisciplinary research. Our methods include participating in observations in three meetings of the actors, and conducting twelve individual interviews, as well as a focus group discussion. Our results identify major conflicts between the actors' perspectives regarding navigation interests and the demands for nature conservation. Potential issues for convergence are ecological river restoration and enhancing recreation opportunities. The findings shed light on the diversity of the stakeholder perspectives around river landscape development. We recommend that future projects capture this diversity through a triangulation approach.

**Keywords:** transdisciplinary water research; knowledge co-production; stakeholder interaction; stakeholder analysis; knowledge systems; thought style

## 1. Introduction

One of the most innovative demands of the EU Water Framework Directive (WFD) of 2000 is that of participatory processes in water management [1–3]. Although no consistent definition is available in the literature for the concept of participation regarding who, when, and how stakeholders should be involved, a shared understanding of participation regards it as multi-dimensional, including (i) the involvement of scientific, non-scientific, and public actors; (ii) the intense exchange of knowledge; and (iii) the provision of the actors with power by involving their perceptions and ideas into the planning processes [4]. Even though no empirical evidence is so far available for a direct link between the participatory processes and knowledge co-production outputs, the proponents of environmental planning and management sciences generally presume that the participation of relevant actors from science and society yield a collective generation of knowledge [5–7].

From a governance perspective, there are some functional advantages of participatory decision-making processes over non-participatory ones, namely: The legitimacy of the decisions can be increased while reducing the level of conflict; it could contribute to the quality of decisions

by providing necessary information for the government, as well as contributing to the identification of the problem and its causes; and it could yield a social learning process about environmental problems and a change in society's behavior [8]. Summing up, the participatory processes could provide a higher collective capacity to act and decide and an increased societal acceptance, as well as potential behavioral changes. Nonetheless, such cooperational parts of the decision processes are often lacking in the implementation processes of the WFD. Junier et al. (2011) point out that there are different stages of stakeholder participation in the planning processes, namely, information, consultation, and cooperation, which is the most participatory alternative, as the actors are involved in the decision-making process. However, the affected actors are usually only informed or consulted during the process, as it is demanded in the WFD [9].

Scientific research can arguably initiate and support such participation. It can help identify actors, investigate their interests, contribute to the knowledge of the ecosystem and its processes, and support implementation actions. Especially in transdisciplinary projects that try to bridge the borders between science, practice, and governance, the early stages of these projects are important to avoid later confrontations (for more details see Section 2). An important part of social scientific research takes place in the scoping phase of transdisciplinary projects, when stakeholders are identified and their interests and motives are assessed.

Scientific approaches to this are, for example, the concept of social learning and collaborative governance, as developed in the European project *HarmoniCOP* [10]. This approach considers social learning in river landscapes as “a means of developing and sustaining the capacity of different authorities, experts, interest groups, and the general public to manage their river basins effectively”. Important aspects are the capacity to deal with differences in individual perspectives, the solving of conflicts, a collective decision making and implementation process, and the mutual learning from experience [6,10–12].

There are already other approaches, such as the IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) or the multiple evidence base (MEB) approaches, that have developed frameworks for transparency by creating synergies between as well as connecting different knowledge systems and values, for a more sustainable planning and governance process. Consequently, navigating the evolution of landscapes towards more sustainable pathways requires not only the active involvement, but also the reflexive collaboration and coordination of diverse actors from science, practice, and society [13–15].

The challenge in this context is obvious, how can actors from different sectors and governance levels, with different knowledge backgrounds, connect their knowledge systems in order to produce transformative knowledge with a wider scope than just their disciplinary one?

Many studies investigating stakeholder analysis focus on stakeholder identification in the wider public and on promoting the involvement of all of the relevant and affected stakeholder groups [16–21]. However, currently, there is very little knowledge about the knowledge systems of the relevant actors, especially in the watershed management, on how to assess and analyze them, and how these findings can be transferred into the design of a transdisciplinary process. Identifying relevant stakeholders, and understanding and connecting their different knowledge systems is an important prerequisite in order to design and implement successful participatory river landscape governance. We hope to provide contributions with broad significance by explicitly examining the knowledge backgrounds, according to the thought styles of the participants in the case study. This could help to investigate the evolution of knowledge generation (and eventually co-generation) over the project lifetime.

The aim of this paper is to elucidate and characterize the interests of the relevant actors in a particular case study for sustainable river landscape development in Germany. More specifically, two research questions are addressed, namely: What commonalities and differences are manifested in the structures of thought and action of the actors in the case study? Where are the possible points of convergence or conflicts of interests that are relevant for further transdisciplinary research?

The paper is structured in the following manner: In the next section we describe the theoretical background of our understanding and definition of knowledge co-generation in transdisciplinary processes. It follows the theoretical framework that we worked with and used for the analysis of the empirical material. Then we give a short description of the case study project ‘LiLa—Living Lahn’, providing a better understanding of our research design and methods in the subsequent section. The results provide characteristics of the relevant stakeholders, describe their respective thought styles, and explore potential the fields of conflicts or commonalities. The paper ends with a conclusion, giving some indications of how these findings could be conducive for future planning processes in river landscapes.

## 2. The Role of Knowledge Co-Production in Transdisciplinary Processes

The successful governance of river landscapes has to deal with complex human–environment–systems, so governance efforts should not only take place on the basis of scientific knowledge, but also should include other types of knowledge from different actors in a cooperational way. One concept dealing with the successful cooperation between actors is that of knowledge co-production. In a cross-actoral and -institutional cooperation, linking different forms of knowledge in an interactive process collectively produces knowledge by combining scientific knowledge with other types of relevant perspectives and local experiences [22]. The initial point, in our case, is the interface of science and practice, which is one object of investigation in transdisciplinary research.

Along these lines, Gibbons et al. introduced Mode-2 knowledge production as the contextualization of the research process, through the participation and collaboration of scientific and non-scientific actors. In transdisciplinary research, both socially relevant but also scientifically reliable knowledge is produced [22–26]. This refers to the transgressiveness of knowledge that occurs in transdisciplinarity, not accepting institutional boundaries as knowledge seeps through institutions and structures in both directions, from science to society and from society to science [27]. In this way, socially robust knowledge is provided that can contribute to more sustainable decisions.

The further development of this form of knowledge production led to a more reflective understanding of science in transformative or Mode-3 science, based on the societal embedment of scientific action [28]. It accepts the inherent changed accountability of researchers in their scientific work and realizes the different contexts of knowledge production. Furthermore, it continuously reflects the institutional conditions of its action [26]. An important element here is the expanded understanding of different forms of knowledge in transdisciplinary processes, leading to societal transformations.

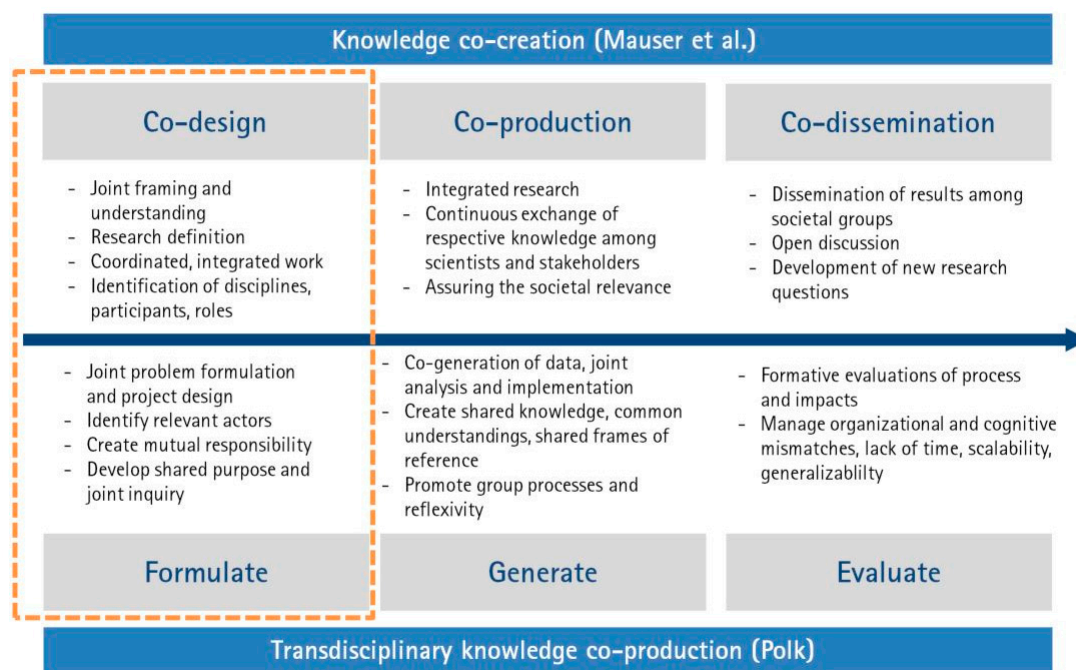
This paper follows the definition of transdisciplinarity by Jahn et al. [29] who define it as “a critical and self-reflexive research approach that relates societal with scientific problems” by producing new knowledge integrating scientific and extra-scientific insights from multi-disciplinary and practice-based perspectives [29,30]. As such, transdisciplinarity always means integrating scientific and non-scientific actors, whereby the latter group can also comprise experts from practice but not necessarily from the general public. The interface of science and practice itself contains different forms of knowledge that coincide through the interaction of the affected actors and could imply a collective generation of knowledge.

Consequently, transdisciplinary processes function as an example for a participatory approach, as they contain a participatory and actor-based way of knowledge generation, accessing not only diverse scientific disciplines but also practice-oriented knowledge and expertise. Both practitioners and researchers take part in the whole co-production process, involving a joint problem formulating, the generation of knowledge, applicability in both scientific and practical contexts, and the control of the process concerning “scientific rigor, social robustness, and effectiveness” [5,22].

Mauser et al. (2013) developed a framework on the process of the co-creation of knowledge, which captures the collaboration between science and other stakeholders as an integrative process of transdisciplinarity, consisting of the phases of co-design, co-production, and co-dissemination [5]. The stage of co-design includes a joint framing and understanding of a particular sustainability research

issue that society is facing, followed by a research definition that leads to a manageable research project. This happens in a coordinated, integrated working manner, providing a common understanding of the research goals among stakeholders and scientific participants, identifying the relevant disciplines, participants, and scientific integration, as well as agreeing on the roles of the different groups [5] (p. 428). The second step is the co-production of knowledge, which consists of integrated research as the “continuous exchange among the participating scientists and with the stakeholders” [5] (p. 428). This ensures the exchange of the respective knowledge among the participants, thereby assuring the societal relevance of the research topic. In the third step, the co-dissemination, the results are spread among different societal groups via publications, and are translated into usable information for the different stakeholder groups and open discussions leading to new research questions.

Polk [22] describes the same process as Mauser et al., naming it transdisciplinary co-production. The different stages are renamed in ‘Formulate, Generate and Evaluate’, but contain nearly the same activities as the three stages by Mauser et al. [5]. Figure 1 shows these two fundamental approaches in comparison, also identifying the starting point of our work. We consider the first phase as the one to be more explored, in order to have a better awareness of the different knowledge systems of the identified relevant actors, because these current approaches of transdisciplinary research are facing some particular challenges.



**Figure 1.** Comparison of two approaches of knowledge co-production processes with the initial point of the paper.

Firstly, the diversity of priorities, knowledge, and practical requirements of the different interest groups have to be identified. Only then can the incompatible and incomparable definitions, values, professional experiences, and political priorities be negotiated and provide a mutual accountability. This process of responsabilization can help bridge the boundaries within and between science and practice, as well as between the affected actors [22,27].

Another challenge is knowledge integration. Jasmin Godemann developed an approach for the integration of knowledge based on three main activities, namely: (i) information and knowledge exchange, (ii) development of a mutual understanding, and (iii) meta-reflexivity within groups [31]. Based on this proposition, in transdisciplinary approaches, a group process will be caused that

provides a common understanding and encourages information exchange through individual and group reflexivity [31].

A third challenge is the application of the results from the knowledge generation process for a societal change. Especially in the implementation phase, contradicting political agendas and interests arise. At this point of the research process, resistant relationships and processes between science and practice receive great attention. These so-called ‘communities of co-production’ leave room for the interaction of scientific knowledge and expertise, and therefore, can counteract a scientification of politics or the politicization of science [22].

From these challenges, Polk derives three strategies for transdisciplinary knowledge co-production: the first is the identification of actors from science and practice, with relevant contextual values, knowledge, and expertise; the second is the common understanding and framing, as well as the mutual generation and analysis of the empirical data; and third, is the usability of the results. The implementation of these strategies remains unclear and provides new problems that transdisciplinary research has to deal with, namely: the time demands, the contradicting roles of researchers and practitioners in the process, and bringing together the different types of knowledge and expertise.

We recognize that all of these studies on the transdisciplinary research and knowledge co-generation face some major challenges in different phases of transdisciplinary processes, but all of them point to the importance of the identification of relevant actors with contextual values, knowledge, and expertise in the scoping phase. Regardless of the challenges in the later stages, we concentrate on further developing these approaches by investigating the knowledge systems of the relevant stakeholders, so that the upcoming challenges in the forthcoming phases of the project could be avoided.

### 3. Knowledge Production as a Social Phenomenon

The concept of knowledge co-production applied in this paper builds upon the approaches introduced above. Knowledge integration and the exchange of information and knowledge occur by the recognition of different knowledge claims and systems, so that they can be incorporated into a common pool of shared information and understanding [5,22]. As is evident, knowledge co-production in transdisciplinary processes has not yet been sufficiently explored, so it still challenges the actors from science, practice, and governance with problems that mainly concentrate on the interface between science and practice. Here the interactions of different actors during the process are considered a key point, as their different knowledge systems could lead to misunderstanding and conflicts. Our analysis therefore mainly focuses on the structures of thought and action manifested in the actors’ behavior and values, as revealed during the early stages of the transdisciplinary process, in order to provide a better understanding of the existing knowledge backgrounds.

One central approach, focusing on the production of knowledge and beliefs, is the theory of thought styles and thought collectives, as described by Ludwik Fleck in the 1940s. There are many attempts to capture the German terms of Fleck’s theory, such as ‘Denkstil’ or ‘Denkkollektiv’ in other languages, but we decided to use the glossary that Cohen and Schnelle developed, as they are experts on Fleck’s work [32].

The initial point is the assumption that knowledge could not be regarded independently from the people who produce and possess it. Not before the social interaction, the so-called communication of thought, leads to the production and preservation of perceptions and beliefs [33]. A precondition for the production of scientific knowledge is the mutual understanding on the basis of a common thought style. Fleck argues that thought styles are collective phenomena as a result of the socialization processes in closed communities. Therefore, a social differentiation into social units takes place that includes these people in thought collectives (e.g., the community of a scientific discipline). What seems important and self-evident for one person or group might be irrelevant or incorrect for another, depending on the individual perceptions through the inherent thought style. Independent of the topic, a physicist may be able to understand a biologist concerning certain diseases or phenomena in the sky, but is

totally unable to understand a theologian [34]. Therefore, one can speak of particular or divergent thought styles as well as related or distant thought styles, which can be temporary or resistant as well. This means that during a conversation, a certain pattern of thought could develop only through the membership of the participating persons in different thought collectives and the dynamics based on that specific constellation. On the other hand, resistant thought collectives gather around established social institutions, such as sciences, religions, professions, or enduring organizations, with certain objectives that presuppose the preparedness for a directed perception [34]. In this way, a thought style arises in a certain thought collective, characterized by mutually accepted norms, consensus about methodological approaches, and criteria for the distinction of science and not-science [33,34]. The thought style is not an individual attribute, it is rather a result of collective thinking providing mutual views, opinions, contexts of thought, and visions. It can be interpreted as a specific preparedness of thinking, leading to the perception of certain phenomena and blindness towards others [32].

Based on this approach, we consider the project group of the case study project as a potential temporary thought collective developing its own thought style during the planning process. As the project is still in an early stage, we can only identify the existing thought styles of the representatives and provide information about the potential fields of conflicts and commonalities in the future process. Therefore, we use certain concepts of Fleck's theory for the analyses of the participating representatives.

### 3.1. Socialization

The first of Fleck's concepts that we apply is socialization. We consider the socialization process through which the representatives went in their lives as one major point of the analyses, because these experiences of belonging to different social groups have a major influence on their ways of thinking. Berger and Luckmann [35] make a difference between the primary level of socialization from the family and early childhood experiences, and the secondary level of socialization later in life, introducing the socialized person to new sectors, people, and conditions that influence his/her social behavior [35] (pp. 129–180). In our analyses, we concentrate on the secondary level of socialization, as we cannot reconstruct the process of primary socialization of the representatives. For our concern, it is of major importance to consider which interests, values, and opinions they carry into the case study project from a professional perspective.

Therefore, we had to reconstruct different stations and positions that the interviewees experienced during their careers that had a major impact on their values, opinions, and visions. Furthermore, their current position and the institution that they are part of have an influence on which perspectives these people have and must thus communicate for an adequate potential representation of their institution. For this purpose, it is important to find out about the relation between the individuals and the institutions' interests, in order to understand their perspective in the project.

### 3.2. Interests, Values, and Visions

The second and central aspects of Fleck's theory are the concrete interests, values, and visions that are explicitly and implicitly communicated by people, in our case the representatives in the case study. The individual thought style is expressed depending on the secondary socialization of the representatives. As the individuals are not aware of the membership of a particular thought collective and the upcoming directedness of their perceptions, they are incapable of controlling their perspectives and the associated interests, values, and visions that they reveal in different ways, as they are incorporated. The interaction with other participants shows how these interests, values, and visions interact and how they relate to each other. In addition to the individual thought styles, the communication among the different participants shows consensual or conflictual topics that lead to the identification of related or distant styles of thought, as described by Fleck [34]. Consequently, in the communication about particular topics, the interests, values, and visions of the individuals are manifested in the communication with and their behavior towards each other, the prioritization of particular topics, and their reactions concerning the behavior of others.

These two concepts are the foundation for the further analysis of the present object of investigation. Based on the theoretical assumptions of Fleck, we investigate the identification of related and distant thought styles in the given case study, in order to provide knowledge about their consensuability and conflictability. This could lead to a better understanding of actors in an early stage of the project, thus avoiding conflicts in the later stages.

#### 4. Case Study: The Integrated EU-LIFE Project ‘LiLa—Living Lahn’

Our case study is the consortium of the integrated EU-LIFE project ‘LiLa—Living Lahn’. This ten-year project started in 2015 and concerns the Lahn river landscape in Hesse and Rhineland-Palatinate, Germany. Integrated LIFE projects are funded by the EU Commission to promote the implementation of important European environmental directives within large-scale areas, such as the Water Framework Directive, the Waste and Air Pollution Directive, and the Birds and Habitats Directive (Natura 2000) [36]. The additional criteria for funding are a high degree of transferability to other European regions, as well as an integrated design and participation of other sectors. In the integrated LIFE project, ‘LiLa—Living Lahn’, these are the maritime transport, agriculture, energy producers and tourism, and also the neighboring municipalities.

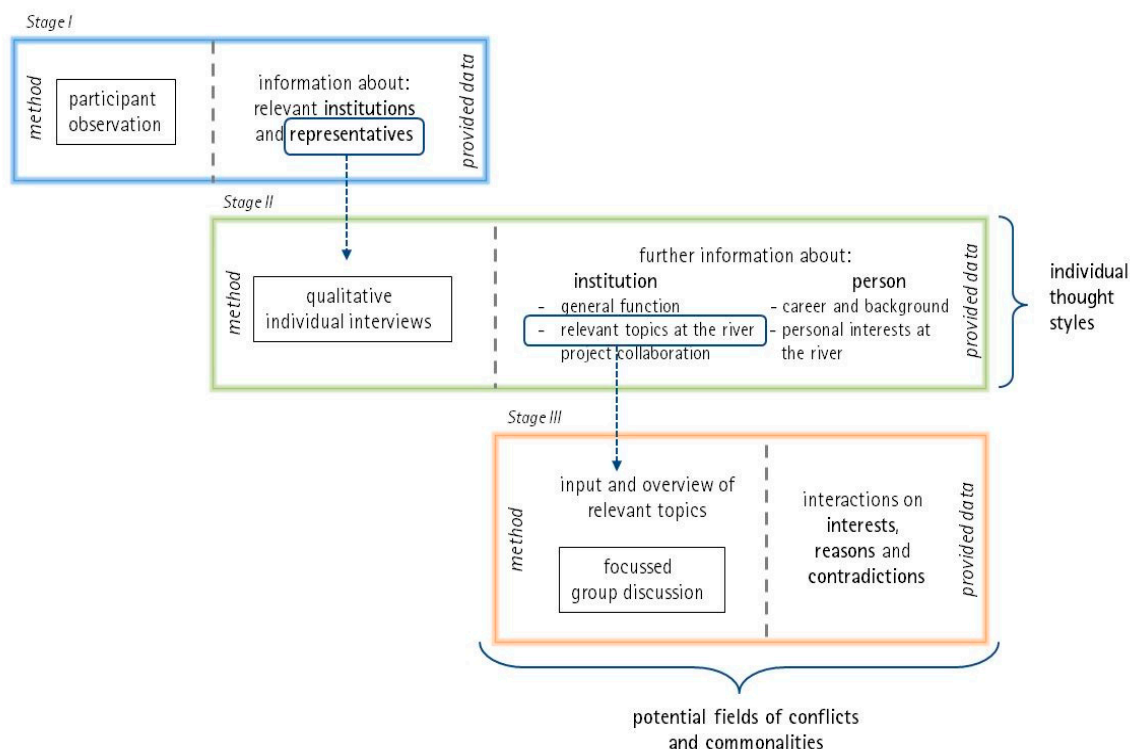
The main objective of the project is to “enhance the ecological health and connectivity of the river itself, while simultaneously enriching the quality of life along the river” [36]. Another main focus is set on the development of an overall concept, called the ‘Lahn Concept’. Here, the further ongoing use as a federal waterway as well as water ecology and revitalization aspects, and flood protection are taken into account in a dialogue-oriented process involving the relevant administrations from the different sectors and levels, and the stakeholder groups that are affected by the potential changes.

Through a public participation process, various stakeholders and the public are involved, for example, by round table discussions and information events in the project area. The project aims at the provision of a coordinated concept, including different types of usage like shipping, hydropower, nature conservation, aquatic ecology, and recreation.

As the project group itself offers a frame for potential knowledge co-generation by developing the ‘Lahn Concept’ during the project lifetime with common aims, interests, and visions of how the river should develop during the next decades, we investigate this early stage of the project concerning the involved stakeholders, in our case, the official project partners. As these partners are integrating different spatial levels from federal and state level administration as well as from different sectors (environmental and waterway administration), the consortium is a perfect example to study a governance model of integrated water resources management (IWRM).

#### 5. Research Design and Methods

To analyze the structures of thought and action of the relevant actors in the case study, we decided on a three-stage research design using methodological triangulation [37] (Figure 2). At the first stage, we identified and analyzed the relevant stakeholders. The boundaries of our case study were relatively clearly defined, so we concentrated on the official project partners from science and practice—who function as active stakeholders according to Grimble and Wellard [38]—as the conception of the project provides a frame for knowledge co-generation within the project team itself. We deliberately decided against the state-of-the-art manner of including additional public stakeholders through an iterative process in the stage of stakeholder identification [39], and therefore excluded the passive stakeholders as those who do not affect, but are affected by a decision or action [40]. Furthermore, there was already an ongoing public participation process set in the case study project, so we had to avoid a parallel process engaging with other more passive stakeholders from the public. Together, the partners have to develop a concept for the further development of the Lahn river, Germany, which is the initial point of our research.



**Figure 2.** Three-stage research design for stakeholder analysis on the multi-level and potential outputs.

The stakeholder analysis took place step by step, as follows: The first method was a participant observation, as defined by deWalt and deWalt [41] as “the process enabling researchers to learn about the activities of the people under study in the natural setting through observing and participating in those activities” [41,42]. Being in contact with the coordinating part of the LiLa project, we had the opportunity to attend some of the internal meetings of the official project partners in the project region. Therefore, we had the chance to informally talk to the different persons, get to know them, and identify the important institutions and the main contact persons from the different institutions that are involved in the project.

After this first free approach, we decided to obtain more information about the different interests, aims, and intentions of the involved decision makers on an individual level, before we could analyze the interactions between them. Therefore, in the second stage, we conducted twelve qualitative individual interviews with the involved representatives of the partner institutions, which covered topics from the general function of the institution, to their relations and interests in the project as well as the personal functions, relations, and interests of the interviewed person within the institution and the project. The analysis of the empirical material gained in the interviews included a two-step coding, following the analytical methods of theoretical coding by Strauss and Corbin [43]. In the first step, the material was coded open in order to collect the data and phenomena in the codes and to disaggregate the contained information. The provided codes can then be clustered into categories that reflect the relevance system of the interviewed person, as expressed in the interview. The second step included a more focused and differentiated analysis of the provided categories concerning the derived concepts from the theoretical framework, as described earlier, which function as axial categories [44]. In this phase of interpreting the material, the indications for the thought styles of the analyzed persons are more obvious. Additionally, the relations and differences between the axial categories and the included concepts are identified, so in the end, there is a concluding concept map that should broadly illustrate the analyzed phenomenon [45]; in this case, it was the phenomenon of thought styles as described by Ludwik Fleck.

Additionally, the participants were asked to spatially locate areas in great need of action and those in less need, on a map, in order to provide visual outcomes regarding concrete issues at the river.

Other results were, among indications leading to the individual thought styles, a wide range of topics of interest, mentioned by the involved representatives of the project, which built the basis for the third stage, the analysis of interactions among the participants. Therefore, we decided on a focus group discussion that was integrated into a workshop in the case study region.

The workshop was the first of a series of five workshops, called the LahnLabs, which have been planned with the actors of the case study project in the following two years. The idea of the LahnLabs is based on the concept of real-world experiments [46] that occur, as a space for the observation of the actors and the relevant socio-technical factors of influence. They can function as a ‘boundary object’ in a transdisciplinary research process, appearing as a reference space for diverse actors and disciplines to exchange and correspond their different knowledge inventories and to produce transformative knowledge [26].

The workshop included input about the relevant topics mentioned in the individual interviews, followed by round table discussions. Each of the tables was related to one topic cluster, namely “nature protection and ecology”, “water economy and infrastructure”, and “utilization of river and landscape”. There were three rounds of discussion including topics such as existing interests and their reasons, and the participants had to rotate tables during the breaks so that every participant had to discuss and give their opinion on every topic cluster. We decided to ask the participants to reflect upon the entire spectrum of diverse perspectives represented at the Lahn river basin and not only to focus on their institutional perspectives and interests. In this way, we tried to avoid the effect of the workshop reproducing potential political conflicts in the real-world collaborations between the project partners. After these focused discussions, they had a plenum discussion about the interrelations of the relevant sub-topics. The participants were asked to discuss the supporting and inhibiting effects of the different characteristics concerning their main topics. The analysis of the group discussion was based on the participating observations and audio files from the table discussions, as well as the results that the participants developed on posters during the workshop. Focusing on very dense parts in the discussions, we could collect the indications for potential fields of conflicts and commonalities. Additionally, we had a professional facilitator leading the group discussions, with a critical view on the interactions in order to avoid the effects of social pressure or the neutralizing effects of the workshop situation itself.

The described the three-stage research approach left us with a wider understanding from an individual level to the interactive institutional level. It provided an overview of the individual styles of thought of the representatives, which are central for a potential co-generation of knowledge supporting the development concept for the river, but also, the interactive discussion parts provide indications for potential fields of conflicts and commonalities.

## 6. Results

We present the results of our analysis in three steps. First, we provide an overview of the identified stakeholders of the given case study on an institutional level. Here, the different involved institutions are illustrated concerning their institutional function, the main focuses and responsibilities in their work, and their relations to other project partners in the case study. Additionally, we give an insight on the number of people who are involved in the case study project from each institution. In the second part, we describe three examples of the analyses of existing thought styles, in order to illustrate the method we used. At the end of this section, we overview the existing thought styles and our findings concerning their relations. In the third and final part of the results, we dig deeper into the potential fields of conflicts and commonalities, as manifested in the material we gained from all three steps of the research design.

### 6.1. Relevant Stakeholders in the Case Study

#### 6.1.1. Hessian Ministry for the Environment, Climate Protection, Agriculture, and Consumer Protection (HMUKLV)

The Ministry is the highest environmental authority in the federal state of Hessen. Its mission is to ensure the sustainable protection of citizens and natural resources, including nature and landscape, soil, water, air and climate, radiation protection, food safety, and animal health and protection. The ministry is led by a state minister, and is organized into eight departments [47]. The department for water and soil is of particular importance for our case study as it serves as the coordinator (with three employees) of the ‘LiLa—Living Lahn’ project. The department is responsible for the overall coordination and the financial management of LiLa, as well as for guiding the cooperation of all of the project partners. Another responsibility is the implementation of individual actions, especially in the Hessian part of the river [36].

#### 6.1.2. Governmental Authority of Gießen (RPGI)

As a federal state, Hessen is divided into three governmental districts. The district authorities assume a special status as they coordinate diverse areas of government. The district authorities consist of different departments, which are each supervised by respective counterparts in the state ministry. The governmental authority of the Gießen district (RPGI), and the departments for nature conservation and water management more specifically, are part of the LiLa project. At the same time, it is a subordinate institution of the HMUKLV [48]. Despite their officially different hierarchical status, both the ministry and the district authority are considered as equal partners in the LiLa project structure. Within LiLa, RPGI is responsible for the implementation of actions for river restoration linked with the Water Framework Directive and Natura 2000, as well as the support and conservation measures for the endangered fish species. Numerous persons from this agency are involved in the planned actions in LiLa, but only two of them function as representatives in the regular LiLa project meetings.

#### 6.1.3. Ministry of Environment, Agriculture, Nutrition, Viniculture, and Forestry of Rhineland-Palatinate (MUEEF)

This Ministry represents the German federal state of Rhineland-Palatinate as a project partner in the case study project, and is responsible for the protection of citizens and natural resources. Their mission is to protect the natural diversity of the flora and fauna, the conservation or restoration of the water system, flood protection, noise and pollutant protection, renewable energy sources and climate protection, and other issues regarding a sustainable development of the environment [49]. Within MUEEF, the department for water management is of particular importance in our case study. The department is responsible, among other things, for water resources management, the implementation of the Water Framework Directive, and the general sustainable development of rivers and watersheds. One individual from MUEEF regularly takes part in LiLa events.

#### 6.1.4. Directorate for Infrastructure and Approval North (SGD Nord)

The Directorate for Infrastructure and Approval North is one of the higher regional authorities in the federal state of Rhineland-Palatinate, and is the executive agency closely working together with the MUEEF. It combines water and waste management, spatial planning, soil protection, land planning, nature conservation and construction, and trade supervision, as well as a service center for entrepreneurs and start-ups, in reliable processes of approval procedures [36]. In this institution, one representative from the department for water management, waste management, and ground protection works together with the project partners in the case study project.

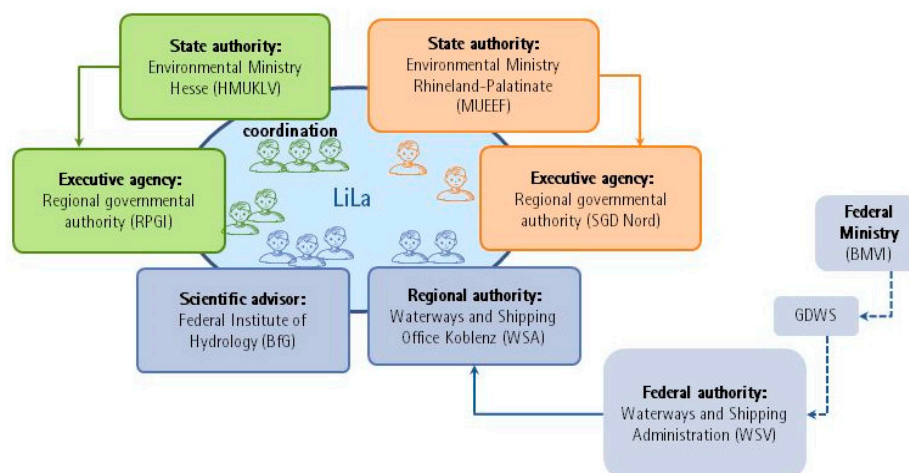
### 6.1.5. Waterways and Shipping Office Koblenz (WSA Koblenz)

The Waterways and Shipping Office Koblenz (WSA Koblenz) is a regional authority within the Waterways and Shipping Administration of the Federal Government (WSV) and with the superiority of the General Directorate for Waterways and Navigation (GDWS). The supreme federal authority is the Federal Ministry for Transport and Digital Infrastructure (BMVI). The WSA Koblenz is responsible for sections of the Lahn and Mosel rivers as part of the federal waterways. Its tasks include the construction and maintenance of hydraulic facilities, river banks and the river bed, and the operation of locks, weirs, and pumps. Additionally, monitoring and regulating the ship traffic and also risk and emergency management are major aspects in their work, as well as the operation of the water gauge and providing the level data for the central flood prevention center [36,50]. There are two representatives from the WSA Koblenz taking an active part in the LiLa project. Following the official statements, competences of the WSV for the administration of federal waterways and the regulation of ship traffic are bound to federal laws such as the Federal Waterways Act, Inland Shipping Act, or the Federal Waterways Act. Concerning the Lahn river, WSA is in charge of the stretch of the river that is included in the federal waterway system. In contrast, general water management issues, such as water pollution and water quality, are the responsibility of the German Federal States [36].

### 6.1.6. German Federal Institute of Hydrology (BfG)

The German Federal Institute of Hydrology has an advisory function to the ministries and the Waterways and Shipping Administration at the federal level. The institute works in the field of quantitative hydrology, qualitative hydrology, and ecology. Its mission is to work together, in an interdisciplinary manner, “to meet the diversity of waterway relevant topics in Germany as well as the challenges arising from them” [36,51]. Within the LiLa project, the BfG provides expertise concerning the hydrological and ecological system of the Lahn river, with a special emphasis on sediment analyses [36]. Three representatives from different areas of expertise from this institute work together with the other partners in the case study project and give advice on special demands.

For an overview of the relevant stakeholders, we developed a simplified figure to provide a better understanding of how the different institutions are related to each other (Figure 3). It shows that the project group consists of different actors from different governance levels from regional to state authorities, as well as from different sectors covering expertise from science, planning and implementation practices and governance. Additionally, the figure shows the existing hierarchical structures outside of the project framing, including the federal and state authorities, whereas in the project framing, the stakeholders formally act like equal partners.



**Figure 3.** Overview of stakeholders considered in the case study, including hierarchical structures outside of the project.

## 6.2. *Styles of Thought*

In order to provide a better understanding of our results concerning the individual thought styles, we present here the results from three of the twelve interviews, with representatives from different scales and sectors. In the analyses, we focused on indications of the secondary socialization on the individual level, as manifested in the careers and structures of thought during the individual interviews. In the way the interviewees express their interests in the case study project, it becomes obvious to what degree they identify themselves with the institution they work for and how they personally value the object of investigation.

### 6.2.1. Individual Thought Styles: Three Examples

#### Person E, Governmental Authority of Gießen (RPGI): The Nature Conservationist View

Person E from the Governmental Authority of Gießen studied an environmental planning-related study, so his/her professional background is in landscape management. He/she did his/her traineeship in the RPGI and stayed there afterwards for a position in nature reserve management. Here, the person worked on spatial issues concerning birds and natural conservation areas, but also on numerous tasks such as the standardization of action planning in the state of Hessen. His/her current position is in the intervention department, looking towards a position at the state level in the Environmental Ministry of Hessen. The different positions the interviewee went through and his/her professional focus show a clear secondary socialization from the administration of environmental management. The person is well aware of the different administration levels and the involved representatives. There is an obvious orientation towards the topics of nature conservation and the implementation of the Water Framework Directive as the legal foundation, which the respondent mentions as the main reason for the institution joining the case study project 'LiLa—Living Lahn' as a project partner.

As their major interest, Person E states the liquidation of the embankment constructions along the river, knowing that this statement is a clear counterpart to the supposed interests of the Waterways and Shipping Agency. These expressed interests give indications on their secondary socialization, which includes mainly the nature conservationist view. When asked about their visions concerning the river, the person described an ecologically sustainable future with less navigation and a large-scale renaturation of alluvial areas for an effective and long-lasting flood protection and a high diversity of species.

Concerning the collaboration between the project partners, Person E recalled initial restraint against the collaboration with the Waterways and Shipping agency, as they had issues in the past. By now, they would be happy about a solution for the long-lasting conflict between the navigation and a natural development of the river, at least in a few stretches of the Lahn. In this context, the person mentions the potential structural changes in the Waterway and Shipping agency concerning the focus of ecological actions, and not only considering the navigation concerns as they used to.

#### Person I, Waterways and Shipping Office Koblenz (WSA Koblenz): The Corporate Concept

Person I from the Waterways and Shipping Office in Koblenz studied construction engineering with a focus on water and environment. Afterwards he/she worked in an engineering office for six years while specialized in ecological actions on watercourses, especially concerning the ecological passability of the river. In 2015, the interviewee started working in another engineering office as a planner and project leader, with a focus on flood protection, until he/she started working for the WSA Koblenz at the beginning of 2016. Person I is a relative newcomer in the Waterway and Shipping Office as an administrative body, so we can assume his/her secondary socialization in the planning practices that he/she worked with in his/her former positions. The respondent admitted that in his/her current position, he/she has to keep his/her technical knowledge from his/her former positions, as in the current position, he/she works more on the administrative level with a more coordinating and

organizing function, so less technical competences are required. Concerning the case study project, the person is the coordinator of the development concept for the Lahn in the WSA, planning time and finances, as well as working in the public relations and other concerns from the EU. The interviewee functions as a representative in public, giving presentations, writing publications, and advertising the project. Additionally, he/she has a close connection to his/her superior institutions, namely the GDWS and the BMVI, as they are authorized to give instructions to the WSA and work relatively close together with the case study project.

His/her major interest is the development of the Lahn concept, which moves the view from a one-sided navigational focus toward an overall societal consensus. As one major challenge, Person I states the combination of ecological improvement and water tourism, which should be solved in a corporate manner. Here, his/her identification with the institutional aims becomes obvious. In the description of the collaboration between the project partners, he/she mentions hardened fronts between the Waterways and Shipping Administration and the state government for nature protection and water management, which the project team wants to solve in the coming years of the process. When asked about his/her visions concerning the future development of the Lahn, the respondent referred to the institutional aim of a corporate solution through a neutral participatory process, so he/she refused to point out special actions as the process is to be conducted without any preconceived views. His/Her rejection to illustrate personal interests in this context shows again the high identification with his/her institution and the defined interests.

#### Person L, German Federal Institute of Hydrology (BfG): The Scientist

Person L studied applied biogeography and described this as a kind of environmental science. Afterwards, he/she worked as a quality manager for a short interim period, but then turned towards a scientific orientation with his/her dissertation project at the BfG. As the project start was postponed because of funding issues, the interviewee had to work in different short-time jobs in order to get to his/her scientific position for the dissertation. His/her short resume shows an obvious orientation towards a scientific career, with a clear orientation of his/her secondary socialization in the scientific environment of his/her professional focus on the evaluation of the sediments. Person L described the work of the institution as a scientific advisory function, without any authority to issue directives. He/she mentions the WSA and the BMVI as organizations the institution is related to, as both of them assign the BfG with scientific tasks. The respondent's main focus in the case study project is the quality of the sediments in the Lahn river for which his/her expertise is included in the project. It became very clear during the interview that Person L acts in a scientifically objective way that reflects their scientific socialization. Concerning the collaboration in the project group, Person L stated that the institution has a special position, as they do not represent any interests but do have access to the needed data from the river, so other project partners have to consult the BfG with different concerns. The person described his/her position as two sided, on the one hand, he/she has a coordinating role within the BfG, which is concerned with different tasks such as public relations and coordinating colleagues in relation to the various scientific tasks within the case study project. On the other hand, he/she concentrates on the analysis of the sediment data and the planning of sample extractions from the river.

Asked about his/her visions for the future of the river, Person L described environmental tourism, which includes facts about different user groups and the river for more sustainable and rational decisions, which are socially accepted and based on touristic and economic data. Even in this personal vision, the values bound to his/her scientific understanding of environmental facts were revealed. Here, it became obvious that his/her socialization was more related to the scientific aspect than with the institution that he/she works for.

#### 6.2.2. Individual or Institutional Thought Styles

Not only in these three short descriptions of thought styles has it become obvious that all of the representatives have a high level of identification with their institution and the presupposed interests

and aims. This is also revealed in the members of the same institution expressing very closely related thought styles, only differing in individual characteristics based on their secondary socialization with different courses (see Table A1 in the Appendix A).

Additionally, there is a very close relation between the thought styles of one state; the representatives of the Hessian Environmental Ministry and its executive agency (RPGI) share a lot of values, interests, and visions. Because of their coordinating function, the representatives of the Ministry have a more overarching view of the project than those from the RPGI, who look further into detailed actions and spatial areas. Likewise, the representatives of Rhineland-Palatinate share similar interests in the case study project to their executive agency (SGD Nord). This is an indication that the institutions and the departments are a strong thought collective with common interests, values, and visions, which are transmitted to the members who carry them further into the case study project.

All of the mentioned values and interests are of professional concern and do not represent the personal interests of the representatives. As the project group contains representatives from different sectors and governance levels, there are a variety of priorities and knowledge backgrounds considered, such as scientific knowledge, practical knowledge, and political concerns, as well as local knowledge of the public, which is included through a parallel participatory process, but informally seeps through the boundaries of the institutions involved in the case study project. Concerning the different interests, the major conflict is stated between the nature conservationist view and the supporters of recreational boating.

### *6.3. Potential Fields of Conflicts and Commonalities*

In this part of the results, we considered an overview of the empirical data provided in the three-stage research approach, as described earlier. We tried to connect the different data bases from the participant observation, the individual interviews, and the focus group discussions to provide some information about the potential fields of conflict and commonalities.

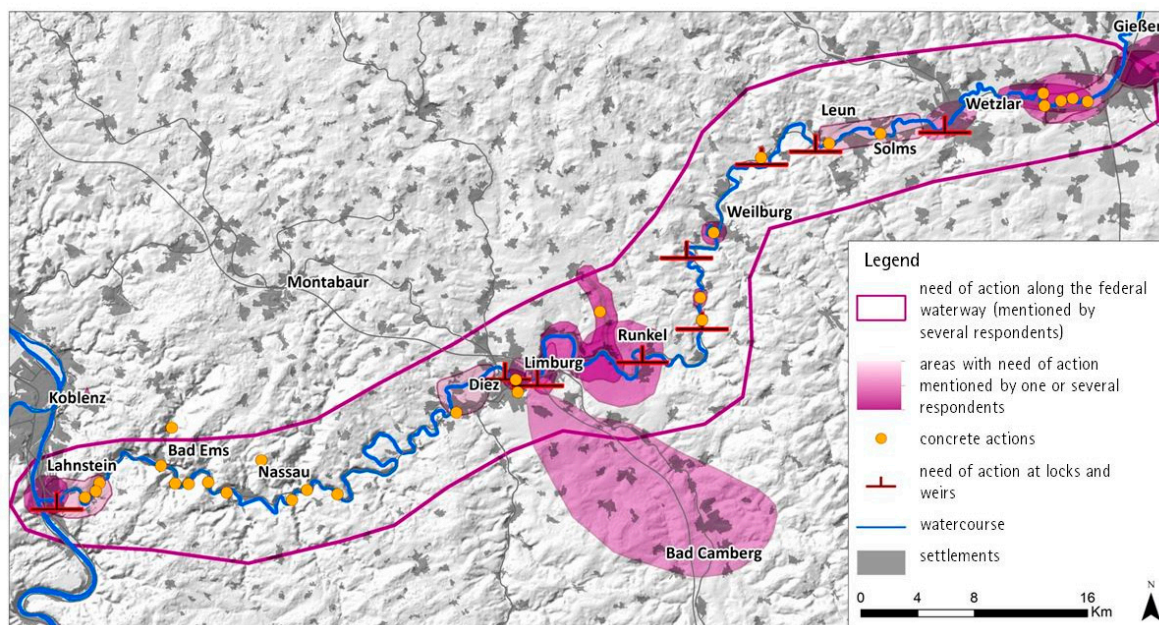
#### *6.3.1. Spatial Conflicts*

In the interviews, the representatives were asked to work with a map showing the stretch of the Lahn river that is to be developed in the upcoming decade. They had to illustrate areas with a special need of action and those with no particular need. The synopsis of all of the edited maps showed some interesting findings (Figure 4).

It is obvious that there are certain areas where most of the project members are in agreement about an existing need of action. These hotspots can be found around the river estuary near Lahnstein, in the middle of the mapped stretch around Limburg, and upstream in the area around Wetzlar and Gießen. They lead to the assumption that these are points and sections with a high potential for controversy in the following planning process. Between these identified hotspots, there are some solitary sections on the map that were mentioned by only one or two representatives as areas in need.

Another controversial topic was the locks, dikes, and transfer devices, which some part of the project group wanted to maintain and repair, while the other part wanted to reduce or abolish them. It was noticeable that many of the respondents aspired to leave the river in its previous state, as nearly every respondent visualized a need of action in the whole stretch of the federal waterway. Another important finding from the individual maps was that the project partners from Hessen as well as those from Rhineland-Palatinate both stopped their further explanations for individual actions and drawings at the border of each state. Although they were well informed about the individual actions bound to their state, they knew only little about the actions of the other partners located in the neighboring state. This shows that in this phase of the project, the responsibilities stop at the state borders without further interest in the other stretches of the Lahn. Only a few of the respondents saw the river as a whole and tried to combine their local and regional knowledge with other actions, particularly the representatives from the coordinating institution and the Waterway and Shipping Administration.

In the case of the scientific partner, it was notable that these representatives refrained from providing their personal opinions on the current object and kept their scientific position during the interviews and the mapping exercise. This became obvious in their individual maps, which were rarely illustrated because they refused to decide on which areas were in need and which were not. All in all, the maps showed a great variety of spatial interests drawn from the institutional representatives, showing that by now, there is only little consensus on the relevant partial areas in the case study area. So far, the different contents of the illustrated areas in need have not been considered, so further research will give some greater insights into potential fields of conflicts and commonalities.



**Figure 4.** Areas in prioritized need of action in the case study region, illustrated by the stakeholders during the individual interviews.

#### 6.3.2. Consensus, Conflict, or Interdependencies of Interests?

As seen in the previous section, the representatives only have little spatial consensus, so we should take a closer look at the contents revealed in the interviews and in the interactions of the focus group discussion. We identified three major topics that were mentioned in nearly every interview, but with different opinions and specifications, as follows:

- Water economy and infrastructure
- Nature protection and ecology
- Utilization of the river and landscape

Regarding the water economy and infrastructure, the navigability was one of the most controversial issues mentioned and discussed during the interviews and the focus group discussions. One part of the project group identified the navigation and its essential components, such as the broad structure of the embankments and locks, as one major reason for the inadequate ecological state of the river.

Others mentioned that navigation not only covered the matter of traffic, but as also an interface for tourism, ecology, and water economy and infrastructure, so concerning the development of navigation, it is not only the traffic matter that should be taken into account. Furthermore, there were also those who differentiated between the muscle-powered and the motorized navigation, and highlighted the high pressure of leisure use and recreation concerns at the river. In this context, the motorized navigation is classed as being of high danger for the ecological sustainability of the Lahn river, whereas

the muscle-powered navigation is more accepted among the representatives as it has a high impact on recreational demands.

Another controversial issue concerning navigation issues is the shoring of the embankments along the river line that part of the project group considers as the main obstacle to the natural development of the river, whereas others value it as a necessary installation for navigation interests.

Concerning nature conservation, there are some people who have stronger interest in the actions that reevaluate the regulated stretches of the river in an ecological way, achieving better results for the Water Framework Directive. One main concern is the ecological consistency and the issue of invasive species, due to the regulation of the river for navigation concerns. Another aspect mentioned in this context is the renaturation of alluvial areas for the revival of retention areas and as an instrument for flood protection.

On the contrary, there were others who see the intensive utilization of the river as a major public concern, so a one-sided focus on the ecological matter would not achieve an overarching solution. Overall, there was a strong tendency for the realization of ecological restoration, predetermined by the Water Framework Directive.

Nonetheless, one of the most consensual topics seemed to be the touristic use of the river. All of the participants value the Lahn river as an attractive destination for several interests such as biking, water sports, or hiking in the watershed. The group aims for a parallel and collective usage of all of the interest groups in a functioning manner. They want to develop a river that is perceptible for different user groups and promotes a concept in concordance with nature.

Another important result of the focus group discussion was the aspect of the interdependencies of the different interests. It became clear that there are many characteristics, which have a supporting effect for some aspects, but also an inhibiting effect concerning other or the same characteristics. For example, tourism can support ecological issues through a sustainable realization, as well as through the environmental education of the public. However, it can also limit ecological efforts, as mass tourism and a high quantity of events can greatly harm nature. Another example is the weir-regulation that supports the navigability for larger ships but restricts the free ride for white water canoers.

Following this, in the end, nearly every mentioned characteristic has two-sided effects on other characteristics of the system. Over the course of the focus group discussion, the previously divergent positions held by the participants concerning major topics became blurred and seemed to converge.

Another important recognition from the final workshop discussion is that the participants rarely used the term 'interests', as in their daily work they mainly use terms such as 'usage' or 'protection'. Usages, such as tourism, hydro power, agriculture, or settlement, compete with nature protection efforts. They claim that the aim of the government should be to allow certain usages while considering the concept of sustainability.

Finally, all of the participants agreed that a close collaboration among the stakeholders and project partners is the key to achieving progress towards sustainable river landscape development, and they all shared a passion to collaborate for joint solutions.

## 7. Discussion

Our research conducts an overarching analysis of the stakeholders in a planning process for river landscapes from an individual level to an interactional level. The results provide evidence for a better understanding and a change of perspective through a multi-level research design that tries to combine the different empirical data in an ongoing process through a methodological triangulation, which guarantees more robust data. The methodological limits of our research design were the previous personnel composition of the case study project team and the reduced transferability of the results. As the project partners knew each other in person, the previous personnel composition could provide more prejudices on a profound or personal level among the participants, rather than on a general or institutional level. The transferability of the results was limited, as we presented an in-depth analysis of a particular case study, with specific conditions that may not be applicable to every other context.

The different perspectives of the representatives in the case study project gave insights into the variety and complexity of the stakeholders in a planning and governance process of a river landscape. It became clear that the stakeholders from different sectors and governance levels with different individual knowledge backgrounds faced some major challenges concerning the cross-institutional collaboration and the mutual understanding of the project.

The results of the participant observation gave an overview of the stakeholders involved in the case study concerning their responsibilities, authorities, and major functions. We found that the variety of sectors and levels displayed some hierarchical relations in everyday life that led to potential issues in the project group, latently expressed through the preconceptions of other institutions, as mentioned in the individual interviews. As the rivers traverse different areas of responsibility, one major challenge is the process of responsabilization, which should lead to a project accountability that conceptualizes the river as a whole, without different responsibilities.

The analyses of the individual interviews gave major insights into the individual thought styles of the representatives. Although the secondary socialization of the project group members significantly differed, we recognized that the members of the same institution often had closely related thought styles, as the institution functions as a potential thought collective (according to Fleck 1936), developing mutual interests, values, and visions. This led to the assumption that the representatives carried the institutional thought style into the case study project. The individual interviews also revealed some major differences in the knowledge backgrounds of the representatives, based on their individual thought styles. We identified scientific, practical, and political knowledge that has been transferred into the project from the different stakeholders. The mapping part of the interviews helped to understand the different spatial perspectives, again referring to the different responsibilities and knowledge backgrounds.

The representatives mentioned a variety of interests that seemed partly incompatible after analyzing the individual thought styles. In particular, the priorities concerning navigation issues and the nature conservation view seemed to be a resistant conflict, until the focus group discussion revealed the interdependencies of the different characteristics concerning both of the topics. We recognized a slightly perceived convergence of stated opinions over the course of the workshop. We cannot exclude the possibility of social pressure or the neutralizing effects that may have led to this development. However, we hypothesize that this convergence was due to the exchange during the workshop, given the specific measures for the political neutrality we had taken. Concurrently, we are aware that the latent convergence of opinions does not necessarily lead to solutions for actual local problems or have a direct effect on the further decision-making and implementation.

## 8. Conclusions

The aim of this paper was to elucidate and characterize the interests of the relevant actors in a particular case study for sustainable river landscape development in Germany. Therefore, we attempted to answer two questions, namely: What commonalities and differences are manifested in the structures of thought and action of the actors in the case study? What are the possible points of convergence or conflict of interests that are relevant for further transdisciplinary research? Our analysis re-emphasizes the particular challenges that the stakeholders face in their efforts to govern the river landscapes. These include the incorporation of various institutions across sectors and governance levels. They have to deal with different competences and responsibilities that affect the cooperation between the stakeholders in a challenging way. The results showed that, depending on the actively involved stakeholders, there are potential barriers impeding their interests in the particular project. In our case study, the most conflictual issues were the navigational versus the nature conservational views, which led to some prejudiced assumptions during the individual interviews and also at the beginning of the focus group discussion. Only the communication and interaction during the workshop provided a mutual understanding of the differentiating views.

In order to provide a better mutual understanding of the different perspectives in the river landscapes, future efforts should invest more time and resources in regular exchange phases within the scoping phase of a project. Specific contributions lie in the examination of knowledge backgrounds according to the individual and collective thought styles of the participants from different sectors and governance levels with different responsibilities. They have to interact cross-institutionally and across state borders in order to corporately produce knowledge that transgresses these boundaries. Based on our results, we recommend a further investigation on the combination of data from the individual and the institutional level as a better understanding of the knowledge systems on the individual level could lead to more sustainable collective decisions. Having recognized the diversity and likelihood of the persistence of divergent stakeholder perspectives, we suggest a comprehensive, engaging, and inter-active scoping phase where the project participants can express their interests, values, and visions in a protected space that leaves room for discussions, thus providing a mutual understanding of the project in an early stage of the process. This could evade substantial discussions and major conflicts based on different perspectives and understandings in the later stages of transdisciplinary processes. We state that the proposed methodology could improve the decision-making processes in such a way that mutual project understanding is promoted through individual and the collective exchange. This could support planning and river management with a shortened process time. Additionally, through early stakeholder awareness, the quality of later decisions is improved in terms of social robustness.

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## Appendix A

**Table A1.** Overview of individual stakeholders per institution concerning their backgrounds and positions on the usage of the river.

Stakeholder	Background (Secondary Socialization)	Position on Usage of the River (Interests, Values, and Visions)
<b>Hessian Ministry for the Environment, Climate Protection, Agriculture, and Consumer Protection (HMUKLV)</b>		
Person A	- Scientific formation in a natural science	- Support for nature conservation and tourism
	- Long-term experiences, different executive positions in the ministry	- Realization and achievement of a good status of the river
	- Development and implementation of the Water Framework Directive	- Professional view: neutral, societal consensus - Personal view: partly free flowing, natural river
Person B	- Vocational training, social sector	- Need of action in the stretch of the federal waterway
	- Scientific formation in a natural science, focus on environmental technology	- Nature conservation, ecological development
	- Quality analysis and management	- Tourism as an important aspect
	- Long-term experiences in the environmental ministry	- Passability for fish and other species - Societal consensus

Table A1. Cont.

Stakeholder	Background (Secondary Socialization)	Position on Usage of the River (Interests, Values, and Visions)
<b>Hessian Ministry for the Environment, Climate Protection, Agriculture, and Consumer Protection (HMUKLV)</b>		
Person C	<ul style="list-style-type: none"> <li>- Academic formation in construction engineering, focus on water treatment technologies</li> <li>- Experiences in practice and administration</li> </ul>	<ul style="list-style-type: none"> <li>- Water management, wide range of important topics</li> <li>- Structuring of reservoir areas</li> <li>- Ecological passability</li> <li>- Consensus among different interests</li> </ul>
<b>Governmental Authority of Gießen (RPGI)</b>		
Person D	<ul style="list-style-type: none"> <li>- Agricultural engineer, behavioral research of farm animals</li> <li>- Ecological cultivation</li> <li>- Long-term experiences in the institution</li> <li>- Water education</li> </ul>	<ul style="list-style-type: none"> <li>- Ecology, biodiversity, information and public relations</li> <li>- Nature conservation</li> <li>- Obvious awareness about contradicting positions with WSV</li> <li>- Parallel existence of nature conservation and an environmentally compatible usage</li> </ul>
Person E	<ul style="list-style-type: none"> <li>- Academic formation in environmental planning</li> <li>- Different positions in the institution</li> <li>- Administration of environmental management</li> </ul>	<ul style="list-style-type: none"> <li>- obvious orientation towards nature conservation implementation of the Water Framework Directive</li> <li>- ecologically sustainable future for the river with less navigation, large-scale renaturation</li> </ul>
<b>Ministry of Environment, Agriculture, Nutrition, Viniculture, and Forestry of Rhineland-Palatinate (MUEEF)</b>		
Person F	<ul style="list-style-type: none"> <li>- Vocational training, healthcare sector</li> <li>- Scientific formation in a natural science</li> <li>- Different positions in the ministry</li> </ul>	<ul style="list-style-type: none"> <li>- Most important aspect: development concept</li> <li>- The Water Framework Directive</li> <li>- Nature conservation in combination with tourism and a perceptible river</li> </ul>
<b>Directorate for Infrastructure and Approval North (SGD Nord)</b>		
Person G	<ul style="list-style-type: none"> <li>- Academic formation construction engineering</li> <li>- Traineeship in water management</li> <li>- Long-term experiences in water management office, different positions</li> </ul>	<ul style="list-style-type: none"> <li>- Flood protection, water pollution control and renaturation</li> <li>- Cooperation for an ecological development of the river</li> <li>- More natural experience</li> </ul>
<b>Waterways and Shipping Office Koblenz (WSA Koblenz)</b>		
Person H	<ul style="list-style-type: none"> <li>- Vocational training, building trade</li> <li>- Scientific formation civil engineering</li> <li>- Traineeship in the institution</li> <li>- Different executive positions in different places</li> </ul>	<ul style="list-style-type: none"> <li>- Main aspect: development concept</li> <li>- Corporate solution</li> <li>- Responsibility for navigation concern with interfaces to touristic, ecological and water management concerns</li> <li>- Acceptance of accountability among all involved interests</li> </ul>
Person I	<ul style="list-style-type: none"> <li>- Academic formation in construction engineering, focus on water and environment</li> <li>- Professional experiences from engineering offices</li> <li>- Newcomer in administrative body</li> </ul>	<ul style="list-style-type: none"> <li>- Coordinating part of the development concept for the river</li> <li>- Open the view from the navigational focus forward to an overall societal consensus</li> <li>- Corporate solution through neutral participatory process</li> <li>- No personal interests, high identification with institutional interests</li> </ul>

Table A1. Cont.

Stakeholder	Background (Secondary Socialization)	Position on Usage of the River (Interests, Values, and Visions)
German Federal Institute of Hydrology (BfG)		
Person J	<ul style="list-style-type: none"> <li>- Scientific formation in natural sciences</li> <li>- Scientific activities at a university and a museum</li> <li>- Long-term experiences at the BfG with executive positions</li> </ul>	<ul style="list-style-type: none"> <li>- Sediment cadastre, scientific concern</li> <li>- Partial responsibility of the Water Framework Directive concerning ecological passability</li> <li>- Natural character of the river on combination with recreational usage</li> </ul>
Person K	<ul style="list-style-type: none"> <li>- Scientific formation agricultural sciences</li> <li>- Focus on relation of soil and environment, ecosystem services</li> <li>- Long-term experience as scientific staff at the BfG</li> </ul>	<ul style="list-style-type: none"> <li>- Scientific perspective: effects on navigation, ecological and public concerns</li> <li>- Natural development of the river with recreational use of navigation</li> <li>- Personal view: renaturation of the river basin</li> <li>- Professional view: coordination of different interests</li> </ul>
Person L	<ul style="list-style-type: none"> <li>- Scientific formation in geography</li> <li>- Dissertation project, scientific orientation</li> </ul>	<ul style="list-style-type: none"> <li>- Sediment cadastre, scientific concern</li> <li>- Soft tourism as an important aspect must be supported</li> <li>- Reduction of navigation in the lower course of the river for the benefit of environmental tourism, renaturation</li> </ul>

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