

# Deliverable 6.1: Common approach and methodological roadmap for the Nexus Dialogues at local and basin level

May 2022, WP 6



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## **6.1: Common approach and methodological roadmap for the Nexus Dialogues in the local and basin level cases**

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### **Dissemination level of document**

Public

### **Abstract**

The objective of the Nexus Dialogues work package (WP6) within the GoNEXUS project is to develop and carry out dialogues at multiple geographic scales within six case study regions, including the Danube, Como, Jucar, Tagus-Segura, Senegal and Zambezi basins, to include a broad range of relevant stakeholders for co-designing WEF nexus scenarios, models, indicators and solutions. The present deliverable D6.1 summarizes the methodological approach that will be employed to organize and implement these Nexus Dialogues at the local and basin level to ensure that project objectives are met.



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# 1. Introduction

WEFE-Nexus issues are often very complex, requiring effective engagement between expert and non-expert stakeholders in order to understand the biophysical inter-linkages between resources and resource flows and social interactions between different actors in the socio-ecological system. Stakeholder engagement is also essential for co-creating and negotiating solutions around how to best manage approaches across sectors and better coordinate decision-making to avoid negative externalities (“trade-offs”) and reach solutions that are feasible, sustainable and equitable. Such engagement can be challenging due to power imbalances between different stakeholder groups and varying levels of knowledge and understanding amongst actors with divergent, and often entrenched, interests.

The **objective of the Nexus Dialogues** work package (WP6) within the GoNEXUS project therefore is to **develop and carry out dialogues at multiple geographic scales within the six case study regions** including a broad range of relevant stakeholders, experts and policy makers of the WEFE sectors for co-designing WEFE nexus scenarios, models, indicators and solutions. These dialogues are implemented at various scales, from the global to the local level, and aim to ensure that:

- relevant nexus challenges in the various case studies are identified and addressed,
- tools and solutions developed match the requirements of basin stakeholders and help to address real-world nexus problems,
- trust and mutual understanding between stakeholders is created and peer-learning and knowledge exchange is supported.

At the **basin, sub-basin and local scales dialogues are planned in the Danube, Zambezi, Senegal, Como, Jucar and Tagus-Segura river basin** (see table 1 below). A total of three rounds of dialogues are planned for each case study region and spatial scale (1<sup>st</sup> round of dialogues around month 15, 2<sup>nd</sup> round of dialogues around month 28 and 3<sup>rd</sup> round of dialogues around month 48).

**Table 1: Overview local and basin-scale dialogues**

Case study	Spatial scale	Dialogue 1	Dialogue 2	Dialogue 3
Danube	River basin	Vienna (Austria)	Remotely	Remotely
	Sub-basin - Tisza	Remotely	Szolnok (Hungary)	Remotely
	Local – Tisza	Szolnok (Hungary)	Szolnok (Hungary)	Szolnok (Hungary)
Zambezi watercourse	River basin	Remotely	Harare (Zimbabwe)	Harare (Zimbabwe)
	Sub-basin – Zambia (pros.)	Pros. Luanda (Angola)	Remotely	
	Sub-basin – Angola (pros.)	Pros. Lusaka (Zambia)	Remotely	
	Sub-basin – Mozambique (pros.)	Pros. Maputo (Mozambique)	Remotely	
	Sub-basin – Zimbabwe (pros.)	Pros. Harare (Zimbabwe)	Remotely	
	Sub-basin – Malawi (pros.)	Pros. Lilongwe (Malawi)	Remotely	
Senegal	River basin	Dakar		Dakar (Senegal)
	Local – Bakel	Bakel (Senegal)	Bakel (Senegal)	Bakel (Senegal)
	Local – Matam	Matam (Senegal)	Matam (Senegal)	Matam (Senegal)
	Local – Kaedi	Kaedi (Mauritania)	Kaedi (Mauritania)	Kaedi (Mauritania)
	Local - Boghe	Boghe (Mauritania)	Boghe (Mauritania)	Boghe (Mauritania)
Como	River basin	Milan (Italy)		Milan (Italy)
	Local - agriculture	Lodi (Italy)	Lodi (Italy)	Milan (Italy)
Jucar	River basin	Valencia (Spain)		Valencia (Spain)
	Sub-basin - Mancha Oriental	Albacete (Spain)	Albacete (Spain)	Albacete (Spain)
	Sub-basin - Valencia	Valencia (Spain)	Valencia (Spain)	Valencia (Spain)
Tagus-Segura	River basin	Madrid (Spain)		Madrid (Spain)
	Sub-basin - Tagus	Madrid (Spain)	Madrid (Spain)	Madrid (Spain)
	Sub-basin - Segura	Murcia (Spain)	Murcia (Spain)	Murcia (Spain)

The decision to hold dialogues remotely or physically is primarily based on budgetary constraints, as well as on the capacity of stakeholders to interact remotely (e.g., local dialogues are developed as physical meetings).

Within the budgetary frame, the decision of which dialogues are held physically or remotely is left to the partner responsible for the dialogue implementation, bearing in mind factors such as COVID-19 restrictions or the specific topics of the meetings, including the need to build trust.

The different dialogues are planned and organized by persons responsible for dialogue implementation in close coordination with case study coordinators and supported by WP6 staff (see table 2 below). For each of the case studies, one supporter from WP6 was assigned who supports the respective case study partners.

**Table 2: Overview of responsibilities per case study**

Case study	Case study coordinator	Responsible for dialogue implementation	Support person from WP6
Global	Marc Bierkens (UU)	Annika Kramer (adelphi)	Annika Kramer (adelphi)
EU	María Blanco (UPM)	Guido Schmidt (FT) Teresa Geidel (FT)	Guido Schmidt (FT) Teresa Geidel (FT)
Danube	Hylke Beck / Ad de Roo (UU)	János Fehér (FAMIFE)	Guido Schmidt (FS) Teresa Geidel (FT)
Zambezi	Paolo Burlando (ETHZ)	Leonissah Munjoma (ZAMCOM)	Sabine Blumstein (adelphi)
Senegal	Amaury Tilmant (ULAVAL)	Amadou Lamine (OMVS)	Jean-Daniel Rinaudo, Rahim Ouedraogo, Laura Seguin (BRGM)
Como	Andrea Castelletti (POLIMI)	Andrea Castelletti (POLIMI)	Jean-Daniel Rinaudo, Rahim Ouedraogo, Laura Seguin (BRGM)
Jucar	Manuel Pulido-Velazquez (UPV)	Sergio Segura Calero (UPV)	Jean-Daniel Rinaudo, Rahim Ouedraogo, Laura Seguin (BRGM)
Tagus-Segura	Manuel Pulido-Velazquez (UPV)	Sergio Segura Calero (UPV)	Jean-Daniel Rinaudo, Rahim Ouedraogo, Laura Seguin (BRGM)

While the six case studies vary in terms of nexus challenges and other framework conditions, the preparation of basin and sub-basin dialogues broadly follows a similar approach, ensuring meaningful involvement of stakeholders in a co-designing process. This approach includes the following steps:

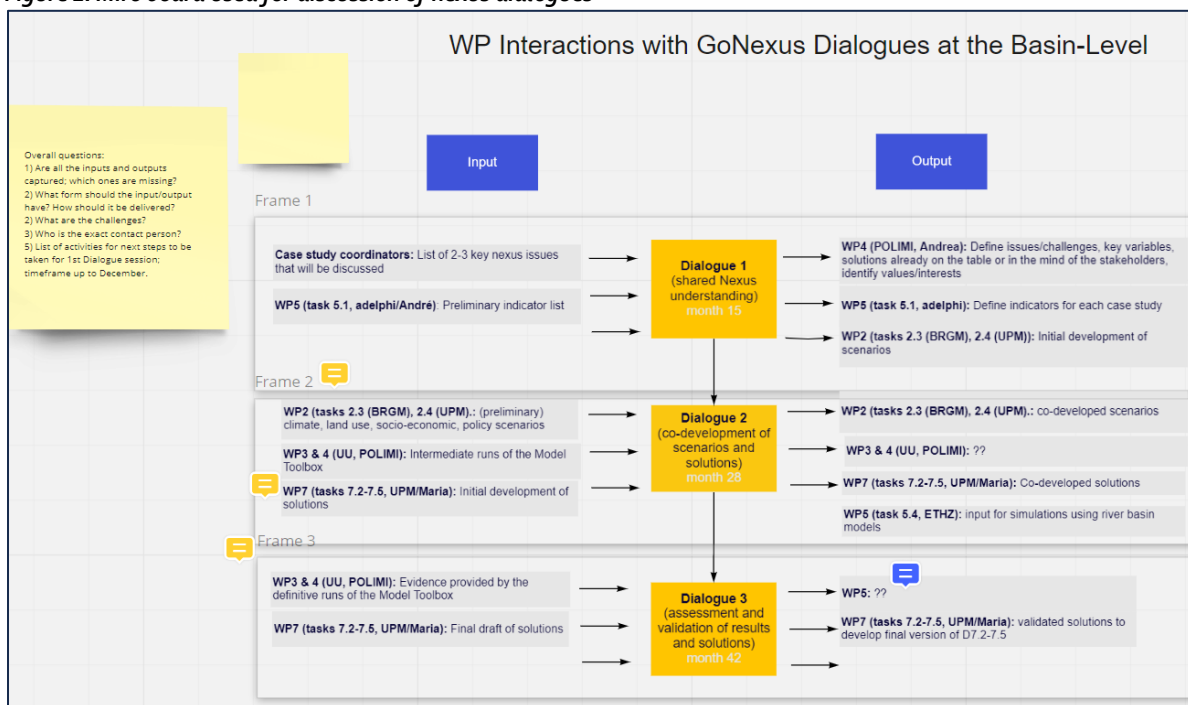
- **Step 0 - Preliminary nexus analysis:** This step is the starting point and provides the basis for preparing the case study dialogues in each basin. It focuses on *identifying nexus challenges in each of the river basins* that could potentially be analyzed and worked on in the course of the project (see chapter 3).
- **Step 1 - Shared nexus understanding:** Based on the results of step 0, step 1 comprises the preparation and implementation of the first round of basin and sub-basin dialogues. Together with stakeholders this step focuses on discussing and validating the specific nexus challenge(s) that will be assessed in GoNEXUS and on *developing a common understanding of these nexus challenges in the respective basin* as well as the driving factors and trade-offs of these nexus challenges at different scales (see chapter 4).
- **Step 2 - Co-developing scenarios and potential solutions:** Building on input from global trends and global modelling the *second set of dialogues will then aim to discuss potential nexus solutions to support development towards desired outcomes*. The result of these discussions will serve as input for alternative scenario simulations (see chapter 5).
- **Step 3 - Assessing and validating nexus simulation results and solutions:** These *last set of dialogues aim to validate results from nexus simulations* and to evaluate selected solutions according to a jointly defined assessment framework (see chapter 6).

This 4-step approach is described in the present document for the **basin-level and local dialogues** (hence excluding dialogues at the global and EU levels, which are also part of the GoNEXUS project but are presented in separate deliverables). Despite the aim to develop an overall common approach, several discussions within the teams as well as with case study coordinators revealed significant differences between case study basins. Case studies, for instance, differ in the baseline work already conducted before the start of the project, as well as in the nexus challenges that could be addressed in the course of the project and hence the models and variables used to model interlinkages, scenarios and solutions. These differences in the context and the background of the case studies demands a more individual case-study focused approach than the one initially planned. In effect, the basin-level and local dialogues in Italy, Hungary and Spain will require less intensive consultations, because similar works with stakeholders have been performed in the past that can be built on.

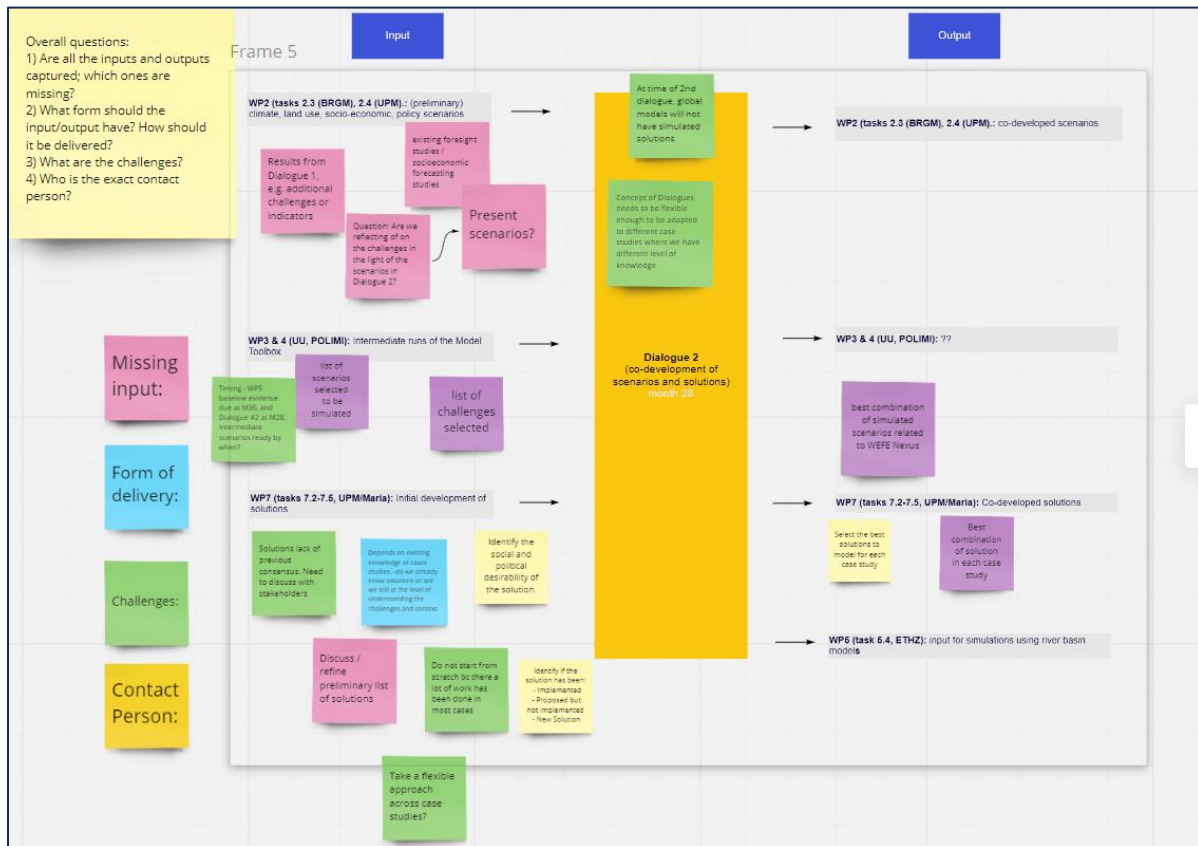
Generally, step 0 step 3 still apply to all the dialogues and their preparation but, depending on the experience, in the case study and the specific challenges, the approach will vary slightly.

The discussion results from the kick-off meeting, where this point was discussed in more detail, were captured in a Miro Board that can be accessed under the following link: [https://miro.com/app/board/09J\\_luKJEek=/](https://miro.com/app/board/09J_luKJEek=/) (also see figure below).

Figure 1: Miro board used for discussion of nexus dialogues







The document is structured as follows: Chapter 2 provides introductory considerations regarding stakeholder analysis and engagement. This is followed by chapter 3, which summarizes the approach for the preliminary nexus assessment that constitutes the overall groundwork for the three rounds of dialogues. Chapters 4, 5 and 6 outline the guidelines for the first, second and third rounds of dialogues, respectively. All chapters are divided into two parts. The first describes the general approach at the basin and local level in a more theoretical way. In contrast, the second part focuses on individual strategies for selected cases for which a more detailed approach has already been defined by the case study team.

## 2. Stakeholder Engagement

### 2.1. Relevance

Stakeholders play a critical role in the GoNEXUS project and are particularly important for identifying nexus challenges and co-creating various scenarios and solution pathways developed in the project. As such, stakeholders contribute to the GoNEXUS project in several ways:

- Stakeholders will support the **evaluation and co-creation of WEFE Nexus indicators, scenarios and solutions in order to enhance their robustness.**
- Stakeholders play a key role in **providing information and data** to support mapping and verifying nexus challenges in order to develop and model a framework that support our understanding of the interlinkages between different sectors.

As GoNEXUS also aims to produce useful solutions for existing Nexus challenges in transboundary river basins, stakeholders play a key role as **beneficiaries who derive valuable information on how to address and solve existing nexus challenges.** Overall, stakeholders can exploit a number of benefits from engaging in GoNEXUS, such as:

- Learning from other sectors and stakeholders about different perceptions on existing WEFE nexus challenges and improve mutual understanding

- Improving knowledge on the WEFE nexus interconnections for more effective policy and decision making
- Providing a portfolio of solutions and scenarios to policy-makers that can, if implemented, help to address existing nexus challenges
- Strengthening partnerships with European and African stakeholders and institutions and contributing to the creation of a community of practice
- Using the knowledge and learning material generated for future project collaborations and academic programs

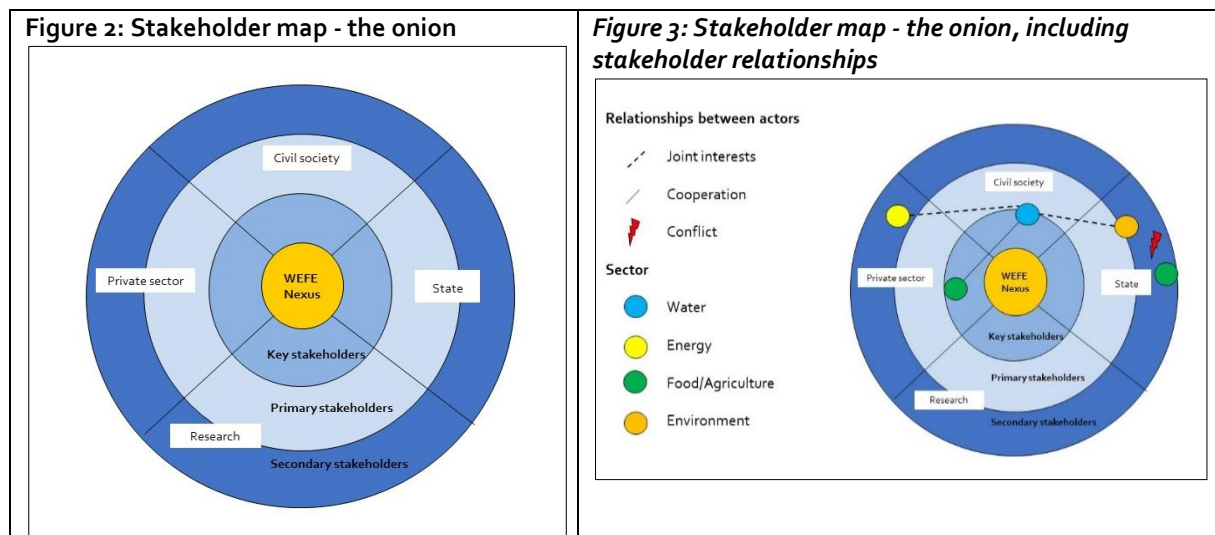
## 2.2. Stakeholder Analysis

In order to identify relevant stakeholders in each of the case study basins that can be invited to participate in the three rounds of dialogues, case study coordinators and dialogue organizers should consider the following steps.

### a) Identify relevant stakeholders

First, all relevant stakeholders that are affected or have a (potential) influence on the identified nexus challenges in each case study should be identified. This evaluation can be based on several written sources, including policy strategies, reports, secondary literature as well as connections and experiences from previous research projects or, alternatively, through interviews or surveys. The analysis must be performed at different scales (from the transboundary to the local), considering different groups of actors, such as research, public and private actors, and civil society.

Different tools can be employed for this approach, including various actor-mapping tools. Note that each nexus challenge in a given case study should map relevant stakeholders separately (hence not combining different nexus topics in one matrix). A helpful visualization tool could be a stakeholder map in the form of an onion (see figures 2 and 3). It has the advantage that stakeholders can be clearly assigned to a specific sector (private, state, etc., or WEFE sectors) and can simultaneously be used to categorize stakeholders with regard to their relevance (such as “key”, “primary” and “secondary” stakeholders).



**\*Key stakeholder:** Include actors that can use their skills, knowledge or position of power to significantly influence a project and without whose support and participation the targeted results of the project cannot be achieved.

**\*Primary stakeholder:** Includes stakeholders that are directly affected by or have direct impact on nexus challenges (also main beneficiaries of project)

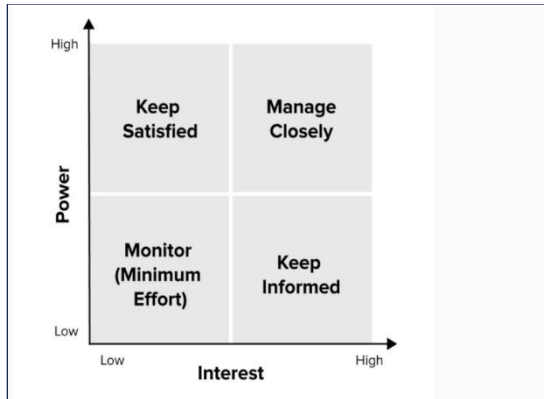
**\*Secondary stakeholder:** Actors that are only indirectly affected by nexus challenges

The tool can also be used to visualize the relationships between actors. The different types and qualities of relationships can, for instance, be represented by different symbols (see figure 3). The mapping can also be used

to indicate sectoral anchoring and relationships between actors. However, the graphic should not be overloaded with too many visual elements.

In case studies characterized by large numbers of actors, other stakeholder mapping tools might be more suitable. One commonly used tool is the power/interest grid which allows plotting stakeholders according to their power/influence and level of interest from low to high (see figure 4). This tool has the advantage of providing an overview even when dealing with large numbers of stakeholders (also considering that due to lack of depiction of interaction you can produce several matrixes, e.g., one for each sector).

**Figure 4: Power-interest matrix for stakeholder mapping**



Furthermore, information on stakeholders can also be collected in matrix form (see table 3 below).

**Table 3: Example of stakeholder matrix**

Organization/actor	Country (scale)	Function	WEFE Sector	Interest in WEFE Nexus	Power in WEFE Nexus	Interests	Level of project engagement
Farmer association	Hungary (local)	Represent and defend interests of farmers	Food/agriculture	High/low	High/low	Maximize agricultural production; keep bureaucracy for farmers low	Consult for data; engage in dialogue Inform about project

**b) Categorize stakeholders**

This step of categorizing stakeholders goes hand in hand with the mapping process outlined above. The objective here is to **understand each stakeholder according to a number of criteria that are relevant to the project**. These categories should be defined according to the main objectives of the project, in order to have a clear vision about which stakeholders should be engaged for each particular aspect of the project.

First, stakeholders will be categorized based on their influence and their involvement into the project (above represented by the categories of “key”, “primary” and “secondary” stakeholders). Since the assessments within the GoNEXUS project comprise the four nexus dimensions of water, energy, food and environment, it makes sense to include these in the mapping (also with regard to the selection process outlined below). Furthermore, one could also categorize according to sectors, including state, private, research, nonprofit, etc., and the level on which they are active (basin, local, state, national, or international).

**b) Select stakeholders for dialogue participation**

In a final step, those stakeholders that are considered most relevant for reaching the project objectives need to be selected from the broader list of stakeholders. These are the ones that should be invited to participate in the Nexus Dialogues. The number of stakeholders invited to the dialogues should not be too large and must be kept at a manageable level.

**This selection process should consider the following criteria:**

1) Degree of impact/influence: This includes stakeholders that are significantly impacted by/have a high degree of influence on WEFE Nexus challenges or possess significant knowledge or power. These include stakeholders that are categorized as “key” and “primary stakeholders” in the above outlined mapping tool (see figures 2&3). However, in cases where these categories comprise a large number of stakeholders an additional graded classification might be necessary. This could be done in form of a three-tier valuation, including 1-high, 2-medium, 3-low impact/influence-levels or by an influence-interest matrix (Reed, 2016).

2) Equal representation: A suitable balance of representation from different WEFE sectors and types of actors (private, state etc.) should be found to ensure that different views and knowledge backgrounds are represented in the dialogue processes.

3) Data/information providers: As stakeholder dialogues primarily serve the purpose to gather knowledge and validate WEFE findings, it is crucial to include relevant knowledge holders. Hence people interested in understanding WEFE complexities and engaged in knowledge-gathering should play a major role in the dialogues. By doing so, case study coordinators should also consider existing information gaps that exist in the case studies and determine which stakeholders could help fill these gaps.

4) Gender: Finally, dialogue events should try to ensure an equal inclusion of women and men. While a completely balanced ratio might be difficult to achieve, coordinators and dialogue organizers should at least make a concerted effort to include women in the events (as they typically remain underrepresented in formal

participatory processes). This could be done, for instance, by explicitly addressing women at stakeholder organizations that are invited to the dialogues and asking them to join the event.

5) Capacity: It should also be considered that some stakeholders might be relevant but lack the capacities to participate and provide inputs to the topics that are discussed (e.g., in terms of resources for travelling to a dialogue event, language capabilities, and technical skills). While this should not be a criterion to exclude stakeholders, coordinators need to be aware that they might have to dedicate extra resources and/or time to include such stakeholders.

While all of the above outlined criteria are considered pertinent for selecting relevant stakeholders for the GoNEXUS dialogue events, they might carry different weight within individual case studies. It should therefore be upon the case study coordinators (together with the dialogue organizer) to find the right balance between these different criteria.

## 2.3. Dealing with challenges of stakeholder engagement

Despite the appeal of participatory approaches to co-explore and address water-energy-food nexus issues, there are significant challenges to ensuring that the involvement of stakeholders is effective (Johnson and Karlberg, 2017). Considering that nexus challenges (and their solution) can be very complex, there is the risk of **overwhelming stakeholders**. To avoid this, dialogue organizers need to ensure that complex information is presented in easy-to-understand formats, including in non-technical ways for those that lack a technical background.

In addition, participatory processes are prone to **power imbalances** where developments and outcomes are framed by powerful interest (such as those from experts within GoNEXUS). Therefore, dialogue processes need to remain open and ensure the inclusion of non-preferred options beyond the options preferred by those with the most power and influence.

Finally, political **insecurities and changes in power** may prevent stakeholders from a continuous engagement in dialogue events. For instance, in many of the GoNEXUS case study countries, changes in political leadership often lead to changes in government organizations. Dialogue organizers, therefore, need to be aware that certain stakeholder groups might not be represented by the same persons in each dialogue.

# 3. Step 0 – Preliminary Nexus Analysis

## 3.1. General approach at project level

The preliminary nexus analysis is the starting point for preparing the individual dialogues in each basin. In this phase, WP6 started a **selection process to identify major nexus challenges that could be addressed in each of the case studies**. The selection is partly based on literature analysis and on previous work of the case study coordinators and other partners in the respective basins. In some case studies, this preliminary analysis is complemented through surveys aiming at characterizing stakeholders' perception of the nexus challenges, highlighting the diversity of (possibly conflicting) visions.

WP6 collected this information via a case study survey amongst case study leaders (based on a template shared with owners, see Annex 1). In a follow-up step, **selection criteria are applied to initially select 4-6 nexus challenges per case study**. These criteria are based on OECD Criteria for evaluation and include (OECD 2021):

1. *Clarity and specificity:* Is the nexus challenge described clearly and specifically?
2. *Significance:* Is it likely that GoNEXUS will provide added value for stakeholders and in terms of scientific/knowledge advancement (or are other studies already underway or planned to address the challenge so we would duplicate efforts)?

3. *Capacity*: Are our modelling tools able to explore most/all WEFE linkages relevant to the challenge? If not, do we have alternative tools to explore the relevant WEFE nexus linkages and possible solutions (and which)?

In a second step, the following two criteria are used to **select the 2-4 most relevant nexus challenges** per case study from the above:

4. *Effectiveness*: Does GoNEXUS WP7 propose relevant and applicable solutions? (once WP7 has developed the solutions suite).
5. *Sustainability*: Are stakeholders interested in this topic? This criterion will (in most cases) be validated at the first dialogue meeting. However, some preliminary discussions with stakeholders prior to the first dialogue meetings may also be used for some cases.

Based on this information, the WP6 team started compiling an **overview matrix** to summarize the case study information received, including a preliminary assessment of the challenges based on the selection criteria mentioned above. The matrix includes a traffic-light table to further narrow-down the nexus challenges that the case studies could address.

**Figure 5: Traffic light table of overview matrix for nexus challenges selection**

	Green – we have an answer to the question and the response to the criteria is positive
	Yellow – we are still working on gathering the information
	Red – we have an answer and the response to the criteria is negative
	Grey – not yet relevant, can only be evaluated later (e.g. stakeholder interest)

The aim was to get a “green or red score” for the first three criteria by March 2022 to go ahead with a limited set of options for the first set of dialogues that are to take place around month 15 of the project. In some case studies, these preliminary nexus challenges have also been refined with key stakeholders (see chapter 6).

Regular case study meetings involving case study owners, dialogue coordinators, WP6 and other relevant partners have been set up to steer this preliminary assessment process as well as the preparation of the individual dialogue meetings whose overall methodological approach is described in the following chapters.

## 3.2. Examples of implementation of the approach in the case studies

### Senegal River Basin

The Senegal River Basin has been the subject of a vast hydraulic development program for several decades, which aims to develop hydroelectric production, allow river navigation and advance towards a modern market-oriented agriculture. This program is part of an economic development strategy that aims to transform the Senegal River into a major energy-food-transport hub in West Africa. However, the gradual implementation (not yet completed) of the hydraulic installations is profoundly changing the hydrological functioning of the river. Water stored in dams is now released to maximize economic profit, while environmental and social needs, which are not considered as productive from an economic point of view, are neglected. This management threatens traditional subsistence agriculture and fishing, two activities that require partial flooding of riverbanks and provide a livelihood for communities along the river.

The preliminary analysis of the trade-off relationships hence revealed the existence of two coalitions of objectives: traditional food production (agriculture and floodplain fisheries) versus “modern” uses (hydropower, irrigated agriculture and river shipping). This broader nexus challenge in the Senegal River and the resulting conflicts at various scales will be analysed in more detail in the preparation of the first dialogue (see chapter 3.2)

### Danube River Basin

At the Danube basin level, the dialogue coordinator initially identified seven challenges. In a follow-up step, the selection criteria outlined above were applied, reducing the list to three potential challenges that could be examined for the Danube River case study (land use management, increased irrigation, ecosystems). These three challenges were discussed in March 2022 with two representatives of the International Commission for

the Protection of the Danube River (ICPDR) to gather their feedback on the topics. While water scarcity and balances were initially considered the most relevant topics, ICPDR highlighted biodiversity as the topic of the highest interest given the overall lack of information and relevant modelled scenarios. They also referred to a set of projects starting in the following months on the topic. The subject is currently being explored by the team of modellers (Status 5 April 2022), though in principle, it looks like all topics can be addressed by the modelling suite. The case study follows the general approach, except for the number of challenges, which is lower than the one initially outlined before the first Dialogue (1-3 compared to 4-6).

## 4. Step 1 – Developing a shared nexus understanding in the first dialogues

### 4.1. General approach at project level

The **first dialogues at the basin and sub-basin level will focus on establishing a “shared nexus understanding”**. Based on the nexus challenges shortlisted in step 0, relevant stakeholders will discuss and agree on the nexus challenges, including the driving factors and trade-offs at different scales, that they consider most relevant for their basin. It is deemed essential to have a pre-selected list of challenges with clearly defined boundaries to be presented and discussed at these meetings to ensure that discussions are focused on challenges to which GoNEXUS modeling, or other approaches, can provide valuable results. Despite this pre-selection, the dialogues should leave room for alternative bottom-up challenges to be voiced by stakeholders. **The challenges will be first discussed at the basin level and then at the sub-basin or local level.** The timing of individual dialogue meetings will be structured accordingly. In addition to discussing/choosing the major nexus challenges to be analyzed with the WEF modelling, the first dialogues will ideally also help to a) select relevant indicators for the chosen nexus challenges, including possible data sources (as an input to WP 5.1 and b) inform initial development of scenarios (WP 2).

The interactions with other WPs for step 1 are summarized in the two tables below, describing the inputs for the 1<sup>st</sup> set of dialogues from other WPs as well as the outputs to be generated from the dialogues for other GoNEXUS WPs.

**Table 4: Input to dialogue 1**

<i>WP/task</i>	<i>Description</i>
5.1	Preliminary indicator list (matching identified set of possible nexus challenges) to be discussed with stakeholders (adequacy of indicators, data sources etc.)
6	Preliminary nexus analysis

**Table 5: Output from dialogue 1**

<i>WP/task</i>	<i>Description</i>
4	List of nexus issues to be addressed in the case studies (list of issues + measures, indicators and values)
5.1	List of (cross-sectoral) indicators that are able to measure nexus trade-offs and synergies for each case study
2.3, 2.4	Understanding of “sustainability” in the case study nexus context; identification of possible scenarios

**A major output from the first set of dialogue meetings at the basin and sub-basin level will be six videos**, each summarizing the main nexus issue that will be covered in each of the case study basins (Deliverable 6.2 “Videos on multi-level shared nexus understanding for the case study basins” month 24). The main objective of

these videos is to make people interested in the second and third dialogues and, additionally, to produce material to be used for training purposes. To produce these videos, WP6 is currently developing a time plan and a storyboard to coordinate inputs and solve any technical issues.

To further guide the planning of the first dialogue meetings, the below checklist will assist the case study coordinators, dialogue facilitators and WP6 to prepare and structure each individual event. The aim is that the case study coordinators (together with dialogue organizers and WP6) have this list at hand to help them check if all of the relevant steps were taken and reflected upon. Some further guidance to selected points is provided below the table.

**Table 6: Checklist for preparation of dialogue 1**

		yes	partially	no
<b>1.</b>	<b>Stakeholder engagement</b>			
1.1	Do we have a comprehensive list of all relevant stakeholders, incl. relevant information on them (background sector, interest, possible conflicts with other stakeholders, role in project etc)?			
1.2	Did we agree on a process to select relevant stakeholders from this broader list to the first dialogue?			
<b>2.</b>	<b>Nexus challenges</b>			
2.1	Do we have a list of case study relevant nexus challenges that fulfil the selection criteria?			
2.2	Have we defined a method to present and discuss this list of challenges (visualization, discussion format etc)?			
2.3	Is this method open enough to allow stakeholders to raise additional nexus challenges?			
2.4	Did we define a process to make a decision about which nexus challenges will be selected?			
2.5	Do we have a plan if a Nexus challenge is chosen that cannot be modelled in GoNEXUS?			
<b>3.</b>	<b>Nexus Indicators (SAF)</b>			
3.1	Did we receive a list of selected case study-specific indicators reflecting the priority issues in the case studies (reflecting the list of pre-defined nexus challenges) from WP5?			
3.2	Have we coordinated the exact questions to be addressed in the dialogue and output that are expected by WP 5?			
3.3	Have we decided on an adequate method to present and discuss this list of indicators with the stakeholders (considering their background knowledge, level of education etc. of stakeholders)?			
3.4	Did we consider possible risks?			

Further guidance:

- 1.1: The approach for stakeholder mapping is outlined in chapter 2.
- 1.2: The approach for stakeholder selection is outlined in chapter 2. Note that to keep the dialogues at a manageable level, the number of dialogue participants should be limited to a manageable amount of people.
- 2.1: The approach for selecting nexus challenges, including selection criteria are outlined in chapter 3.
- 2.2: Annex 2 contains a proposed agenda for the first dialogue, including a process for selecting nexus challenges.
- 2.4: Chapter 2 outlines the proposed approach.



2.5: While this is not ideal, case study coordinators should think about if/how to proceed in case stakeholders are only interested in a nexus challenge that cannot be modelled (e.g., in terms of resources that could be allocated to an alternative approach).

## 4.2. Examples of the implementation of the approach in case studies

### Senegal River Basin

The drastic change in water management is triggering debates and conflicts at international, national and local levels. Understanding those conflicts and the underlying stakeholder interests is considered a prerequisite to organizing dialogues as part of GoNEXUS. In preparation of the first dialogues, the project team working in Senegal (Cheikh Anta Diop University in Dakar, University Laval, OMVS, and BRGM) has decided to conduct a series of semi-structured interviews to analyze the different perceptions and conflicts around the nexus challenges.

First of all, interviews and workshops will be conducted at the basin level (riparian countries) and at the local level (five villages in the lower valley). The objective of the survey is twofold:

- Firstly, to **characterize how stakeholders perceive the trade-offs** associated with the prioritization and choices made in the water resource management. The survey aims to collect stakeholders view points on what they consider to be the priority objectives of water management, and their justification of these priorities in terms of economic, social, political, environmental or ethical criteria.
- Second, to collect the stakeholders' visions of the **major changes** (economic, climatic, technological, social and political) that are likely to affect water management in the basin in the next 30 years. We will try to identify the main factors of change, to formulate hypotheses of trend evolution or rupture and to consolidate these visions in the form of contrasting scenarios.

The interviews will be carried out partly by telephone or videoconference and partly face to face in Senegal (a one-month mission in Senegal is planned in May 2022). They will concern about 40-50 national and international experts, representatives of public decision-makers, companies, water infrastructure managers, local authorities, NGOs, etc., in order to cover a plurality of points of view. The **interview guidelines**, which will be sent in advance to the participants, will be structured around the following five main questions:

- (1) Who are the main actors involved in water management and who should be involved in a substantive debate on the future of the Senegal River management?
- (2) What are the sectors favored by public policy in the current situation and how should this situation evolve (in an ideal world)?
- (3) What are the main areas of conflict between water-dependent sectors in the current situation?
- (4) What are the main factors of change that are likely to alter the balance between sectors in water management in the next 30 years?
- (5) What are the competing visions for the trade-offs between components of the nexus in the current situation and in the future?

A written **synthesis** of the information collected during interviews will be circulated to the participants before being discussed at the first dialogue meeting, which will be organized in the fall of 2022, probably using a hybrid format (videoconference and face-to-face in Dakar). This debate aims to allow stakeholders to share their points of view, leading to the construction of a common representation of the issues of the water-energy-food-environment nexus in the Senegal River basin.

## 5. Step 2 - Co-developing scenarios and potential solutions in the second dialogues

### 5.1. General approach at project level

At the second set of dialogues, around month 28, stakeholders will discuss **different development scenarios and potential nexus solutions** to address the nexus challenges as agreed upon in dialogue 1 and to support development towards a desired future.

By the time of the second dialogue meetings, basin and sub-basin modelling in WPs 2 and 4 will have produced a set of (preliminary) **scenarios** for land use, climate change, socio-economic and policy developments depicting a variety of different future situations. These different scenarios will be presented to stakeholders at the second dialogues in order to discuss the desirability of these scenarios and (potentially) also propose different future visions. Different methods and tools can be used to convey these scenarios, including visualization tools, such as nexus maps, or narrative approaches, such as storytelling, videos etc. The choice of methods used will depend on the stakeholder groups involved in each individual dialogue, their knowledge background and experiences with interactive dialogue processes. The results of these discussions will serve as input for alternative scenario simulations using the river basin models (WP5.4). A modeler will be present at each meeting to explain and answer participants' questions.

In addition, and based on the verification of scenarios, the second dialogues will also be used to **discuss possible case-study specific solution options** to achieve the desired future visions. These solutions, which cover different categories, including policy, institutional, technical and risk-hedging approaches, will be developed by WP 7 (see Deliverable 7.1). The solutions will be developed WP7 in close coordination with case study coordinators and WP6. Considering the limited scope of the second dialogue events (approx. 1-2 days) only 2-3 solutions per case study can be discussed during these dialogues. To narrow down the list of preliminary solutions that can be discussed and evaluated with stakeholders, WP 7 developed a set of criteria to pre-select relevant solutions (see D-7.1, chapter 5.1). These include 3 main solution quality characteristics: Feasibility, desirability, and sustainability. In addition, each element has sub-characteristics that must be independently analysed.

It is furthermore recommended to **include selected stakeholders in the process of developing preliminary solutions** in order to a) ensure that solution options that are being developed are relevant and feasible and moving in the right direction and b) to clearly define the scope of input required from stakeholders during the second dialogues. We suggest holding regular meetings between the first and second dialogues to prepare for this. These preparatory meetings should be held regularly prior to the dialogues and include case study coordinators, dialogue organizers as well as WPs 7 and 6.

The expected inputs to and outputs from the second round of dialogues from the various WPs are summarized in the two tables below.

**Table 7: Input to dialogue 2**

<i>WP/task</i>	<i>Description</i>
WP2 (2.3, 2.4)	Preliminary outputs of climate, land use, socio-economic, policy scenario modelling
WP 3 & 4	Results of baseline runs of models/ Model Toolbox
WP7	Initial sets of policy, technical/operational, risk-hedging and institutional intervention options (solutions)

**Table 8: Output from dialogue 2**

<i>WP/task</i>	<i>Description</i>
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WP2 (2.3, 2.4)	Co-developed scenarios
WP7	Evaluated and refined (preliminary) set of co-developed solutions
WP5 (5.4)	Input for simulations using river basin models

The major output from WP6 of the second round of dialogues will be Deliverable 6.3 "Report on the Nexus Dialogues for the co-development of scenarios and solutions for the case study basins" (month 33).

The below checklist will help the case study coordinator, dialogue facilitator and WP6 to prepare and structure the second dialogues. The aim is that the case study coordinators (together with dialogue organizers and WP6) have this list at hand to help them check if all of the relevant steps were taken and reflected upon.

**Table 9: Checklist for preparation of dialogue 2**

		yes	partial-ly	no
<b>1.</b>	<b>Nexus scenarios</b>			
1.1	Do we have clearly defined scenarios and are quantitative assessments translated into narratives that stakeholders can understand?			
1.2	Did we define a process/method for stakeholders to decide about the most desirable scenarios?			
<b>2.</b>	<b>Nexus solutions</b>			
2.1	Did we discuss with WP7 about the selection process of solutions options (based on their suggested criteria)?			
2.2	Do we have a list of these pre-selected solutions that includes all relevant information that need to be discussed at the dialogues?			
2.3	Did we define objectives and methods for further developing these solutions with stakeholders?			
2.4	Did we define and invite stakeholders that will help us to fill information gaps for solutions options?			
2.5	Do we know how we collect the results of these discussions and feed them back to WP7?			
2.6.	Did we define which of the stakeholders work on which solution and represent/ assess which sector while doing so?			

## 5.2. Approach in selected case studies

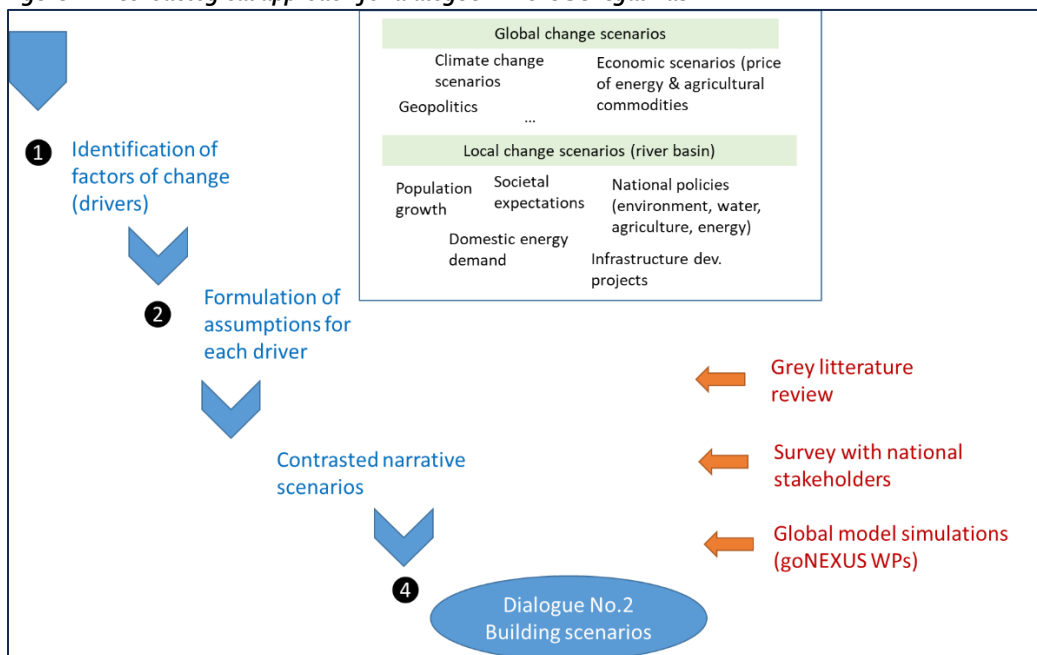
### Senegal

The methodological approach for the Senegal River Basin will be the following:

- The interviews conducted in May 2022, together with the literature review, will be used to identify major factors of change (driving forces). This analysis will systematically review factors impacting the different components of the nexus, e.g., agriculture, energy, transportation, ecosystems, water supply ..., distinguishing global change factors (e.g., international markets and policies) and local change scenarios (e.g., national policies). The figure below illustrates the diversity of factors considered.
- For each of the main factors of change, we will consider several possible future pathways which will be described as micro-scenarios, combing narrative description and quantified assumptions (e.g., increase of irrigated area in hectares, capacity of newly created hydropower dams, increase in food demand or agricultural market prices).

- These micro-scenarios will be combined to form a limited number (3 to 5) of integrated scenarios, depicting contrasting visions of possible future management strategies of the nexus. Scenarios will be crafted to reflect the dominant visions of the nexus but also trend-breaking (iconoclastic) visions purposely developed to trigger debate among stakeholders.
- The scenarios will be presented to stakeholders during the second dialogue using a narrative format, either in a written form (fake press release) or using a short video (fake TV report). Scenarios will be used as a support to facilitate the expression of stakeholders' viewpoints. Participants will be encouraged to criticize the assumptions and propose alternative visions. The expected output is a list of issues likely to arise in the future for which innovative approaches (solutions) should be developed. The discussion of those solutions will be the focus of the third dialogue.

**Figure 6: Methodological approach for dialogue 2 in the Senegal Basin**



## 6. Step 3 - Assessing and validating nexus simulation results and solutions in the third dialogues

### 6.1. General approach at project level

The specific approach for the third dialogue events is still somewhat open as it very much depends on the work and experiences from the two initial rounds of dialogues. Therefore, this part of the report remains work in progress and will need to be finalized in the course of the project.

Overall, the last dialogues around month 42, aim to **evaluate evidence from nexus simulations and selected solutions**. At the basin-scale, models will simulate WEFE nexus challenges under expected future climate and land-use scenarios and for identified policy and other solution options (WP5 & 7). The outputs of these

simulations will allow a comparative analysis of impacts of these solution interventions across different spatial scales (from the local to the basin-level). These solutions simulations and their expected impacts will be presented and discussed with stakeholders during the third set of dialogues. The aim is to identify the most suitable and desired set of solutions at each scale and identify possible adjustments in solution approaches that need to be made. This process will be facilitated by the Sustainability Assessment Framework (SAF), providing a tool to assess the solution options based on defined indicators (WP5).

However, by the end of the third dialogue sessions, **stakeholders should have a clear vision of the future scenarios they aim to achieve** regarding the respective WEFE nexus challenges they identified at the beginning of the process. Additionally, they should be **aware of the set of solution tools (including technical, political, socio-economic etc.) and their respective impacts** that would facilitate reaching these future scenarios.

The expected inputs to and outputs from the second round of dialogues from the various WPs are summarized in the two tables below.

**Table 10: Input to dialogue 3**

WP/task	Description
WP5 (5.4, 5.1)	Evidence/results provided by scenario modelling (Model Toolbox)
WP7	Final draft solutions

**Table 11: Output from dialogue 3**

WP/task	Description
WP7	Understanding of cross-sectoral impacts of defined solutions; approved solutions

The major output from WP6 of the third round of dialogues at the basin and sub-basin level will be D6.4 "Report on the third Nexus Dialogues on validated multi-level solutions for each case study basin".

The preliminary checklist below aims to support the case study coordinator, dialogue facilitator and WP6 team to prepare and structure the third dialogues. This checklist is still incomplete and will have to be developed further in the course of the project.

**Table 12: Checklist for preparation of dialogue 3**

		yes	partial-ly	no
<b>1.</b>	<b>Nexus scenarios</b>			
1.1	Have we translated the results of simulated scenarios (for identified policy and other solution options) into a descriptive narrative that stakeholders can understand?			
1.2				
<b>2.</b>	<b>Nexus solutions</b>			
2.1	Do we have a list of clearly outlined final solutions to be approved by stakeholders?			

## 6.2. Approach in selected case studies

### Senegal

The hydroeconomic model developed by the University of Laval will be used to simulate the impact of changes considered in scenarios debated during the second dialogue. The results of those simulation will be discussed in the third dialogue together with potential solutions that have been identified during the second dialogue. How this part of the work will be performed will be defined after the first two dialogues have been conducted.

# Annex 1: Template for Case study Nexus Challenges

Case study: [name of case study]

## Nexus issue 1

### Nexus overview:

[Include 15-20 lines description of the challenge.]

### Trade-offs

[Describe the explicit WEFE nexus trade-offs and note the ways that the nexus sectors (and which ones) are impacted by the issue.]

### Policies

[Highlight conflicting policies/management frameworks in relation to the nexus challenge (e.g., GND, CAP, WFD as well as local/regional policy conflicts).]

### Synergies/solutions

[Name ideas and approaches for possible synergies/solutions.]

### Stakeholders

[Outline the main stakeholders and their WEFE nexus role in the table below.]

**Table 13: Stakeholder table**

Major stakeholders concerned	Stakeholder interest	Potential conflict with other stakeholders

### Scientific relevance

[Describe the scientific contribution that could be derived from the case.]

### Modelling considerations

[Can GoNEXUS models capture the WEFE nexus challenge? If not, how could the case be addressed otherwise? Who is working on this case study? Please remember to check if you added all people from your team on this list.]

# Annex 2: Draft Agenda Dialogue 1

This is a draft agenda for the first dialogues of the GoNEXUS case studies, and it **shall be adapted to the case study circumstances** including the number of participants as well as to the delivery mode (presential, online). Breaks need to be introduced.

**Table 14: Draft Agenda Dialogue 1**

<b>Item 1: Welcome, tour-du-table and purpose of the meeting</b>
<ul style="list-style-type: none"> <li>• Objective: To set the scene for the rest of the meeting and share expectations</li> <li>• Format: A brief welcome and textual explanation; and tour-du-table (all)</li> <li>• Responsible: Responsible for dialogue implementation (as Master of Ceremony; the MoC also moderates all later question and answer sessions)</li> <li>• Duration: 10-15 min.</li> <li>• Elements: <ul style="list-style-type: none"> <li>○ Aim of establishing a “shared nexus understanding”</li> <li>○ Output: Agree on one nexus challenge to be further assessed, and on its elements, interlinkages, data available, possible model results and relevance, from the different participant viewpoints</li> <li>○ Explanation that a video will be filmed to document the discussion</li> <li>○ Application of Chatham House rules (no specific mention of personal interventions outside this group)</li> <li>○ Any questions?</li> </ul> </li> </ul>
<b>Item 2: Introduction to the GoNEXUS project</b>
<ul style="list-style-type: none"> <li>• Objective: To explain the project background</li> <li>• Format: Presentation based on a power point (general project presentation ppt)</li> <li>• Responsible: Case study coordinator</li> <li>• Duration: 10 min.</li> <li>• Elements: <ul style="list-style-type: none"> <li>○ Purpose and expected outputs and outcomes of the project</li> <li>○ Introduction to the nexus concept</li> <li>○ Outline benefits of the project for stakeholders</li> <li>○ Any (clarification) questions?</li> </ul> </li> </ul>
<b>Item 3: Introduction to the case study</b>
<ul style="list-style-type: none"> <li>• Objective: To explain the case study selection (why), the area concerned (where), context and GoNEXUS focus (what), the selection of stakeholders for the meeting (who)</li> <li>• Format: Presentation based on a power point</li> <li>• Responsible: Case study coordinator</li> <li>• Duration: 15-20 min.</li> <li>• Elements: <ul style="list-style-type: none"> <li>○ case study selection (why)</li> <li>○ area concerned (where)</li> <li>○ context and GoNEXUS tools (how): baseline, business as usual modelling, alternative modelling or discussion of solutions (e.g., present a preliminary list of possible solutions)</li> <li>○ selection of stakeholders for the meeting (who)</li> <li>○ Any clarification questions or overall comments</li> </ul> </li> <li>• Output: List of (relevant) comments – e.g., missing stakeholders, gaps in understanding – that shall be addressed by the GoNEXUS team in further work and before the Dialogue 2</li> </ul>
<b>Item 4: Introduction of key nexus challenges</b>
<ul style="list-style-type: none"> <li>• Objective: To introduce and discuss the preliminary list of key nexus challenges (what)</li> <li>• Format: Presentation and moderated discussion</li> </ul>



<ul style="list-style-type: none"> <li>• Responsible: Case study coordinator</li> </ul>
<ul style="list-style-type: none"> <li>• Duration: 20-30 min.</li> </ul>
<ul style="list-style-type: none"> <li>• Elements:           <ul style="list-style-type: none"> <li>○ List of first identified challenges</li> <li>○ Reference to previous or similar projects in the area</li> <li>○ Process of developing key nexus challenges within the project team (criteria applied so far)</li> <li>○ Draft case study nexus model</li> <li>○ Clarification questions</li> <li>○ Discussion of completeness/adequacy of key nexus challenges; eventual additions (new key issues) to be noted and agreed if they shall be further assessed</li> </ul> </li> </ul>
<p><b>Item 5: (Common) understanding of key nexus challenges</b></p>
<ul style="list-style-type: none"> <li>• Objective: To establish a “shared nexus understanding”</li> </ul>
<ul style="list-style-type: none"> <li>• Format: Discussion in smaller groups (4-6 people each) on the basis of a printed case study challenges model/schema</li> </ul>
<ul style="list-style-type: none"> <li>• Responsible: Responsible for dialogue implementation, supported by rest of team</li> </ul>
<ul style="list-style-type: none"> <li>• Duration: 45 + 15 min.</li> </ul>
<ul style="list-style-type: none"> <li>• Elements:           <ul style="list-style-type: none"> <li>○ Explanation of process: Each group addresses one nexus challenge (or maybe some groups overlap) and work on a printed case study nexus model. They are asked to complement it with new interactions, data sources, concerns and questions.</li> <li>○ Group work; guiding questions:               <ul style="list-style-type: none"> <li>▪ Are all interactions depicted in the model/schema map? What is missing?</li> <li>▪ How important are these interactions? Mark the most relevant ones?</li> <li>▪ Which data do you know about the interactions? Are they detailed and reliable?</li> <li>▪ ...</li> </ul> </li> <li>○ Presentation of group work to plenary. GoNEXUS team adds/integrates comments to the model schema(s) on the wall/flipchart</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Outputs: Improved model(s) for the key nexus challenge(s). To-do list for GoNEXUS team for model improvement after the dialogue.</li> </ul>
<p><b>Item 6: Selection of key nexus challenge</b></p>
<ul style="list-style-type: none"> <li>• Objective: To select one key nexus challenge for the further work of the project</li> </ul>
<ul style="list-style-type: none"> <li>• Format: Discussion in plenary</li> </ul>
<ul style="list-style-type: none"> <li>• Responsible: Responsible for dialogue implementation</li> </ul>
<ul style="list-style-type: none"> <li>• Duration: 45 min.</li> </ul>
<ul style="list-style-type: none"> <li>• Elements:           <ul style="list-style-type: none"> <li>○ Explanation of the process and (new) selection criteria; aim of selecting one key nexus challenge (if applicable)</li> <li>○ Sticky note exercise, adding “strengths” and “concerns” to the (different) key nexus challenges (this also includes the project team, e.g., regarding modelling capacity)</li> <li>○ Reading out/sharing and understanding/discussing of listed strengths and concerns within the plenary</li> <li>○ Identification of the key nexus challenge with the largest number of strengths and lowest number of concerns</li> <li>○ Decision: Option 1 (preferred): Agreement on one challenge; Option 2 (Voting)</li> <li>○ View of the case study coordinator on the decision taken; incl. feedback on how the concerns can be best taken into consideration</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Output: Selection of one key nexus challenge for further work under GoNEXUS. List of GoNEXUS commitments for taking stakeholder concerns into consideration.</li> </ul>
<p><b>Item 7: Next steps, wrap up and thanks</b></p>
<ul style="list-style-type: none"> <li>• Objective: To clarify the way forward</li> </ul>
<ul style="list-style-type: none"> <li>• Format: Presentation of planned next steps</li> </ul>
<ul style="list-style-type: none"> <li>• Responsible: Case study coordinator</li> </ul>

<ul style="list-style-type: none"> <li>• Duration: 10 min.</li> <li>• Speaking elements:           <ul style="list-style-type: none"> <li>○ Outcomes from dialogue 1</li> <li>○ Lessons learned from dialogue 1 – thank you to participants</li> <li>○ Planned work (modelling, listing of solutions, etc.) and timeline</li> <li>○ Planned next dialogue, e.g., already fixing a date/week</li> <li>○ Interaction until next dialogue (e.g. for sharing data or other input from SH side)</li> <li>○ Thanks to all</li> </ul> </li> </ul>
<b>What needs to be prepared in advance?</b>
<ul style="list-style-type: none"> <li>• General presentation (ppt, video) of GoNEXUS project (item 2)</li> <li>• Presentation (ppt) of case study (item 3)</li> <li>• Presentations and model maps/schema introducing the identified nexus challenges which can be understood by stakeholders (but are also not too simple; item 4)</li> <li>• Template for discussion of nexus challenges (item 5), including brief outline of nexus challenge, guiding questions for discussion, templates (such as tables) for collecting answers that can then be presented to plenary</li> </ul>

# Literature

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