

D.T4.4.1 Report on 'Road map for decision targeted communication of green risk management'.

GREEN RISK 4 ALPS



WP T4 - ACRI: Acceptance raising for Ecosystem-based risk control

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1. Road map for raising actors' awareness of and acceptance for scientific information about Natural Hazard Risk Management (NHRM)

“The first step toward change is awareness. The second step is acceptance “ (Nathaniel Branden).

This road map introduces an effective procedure for raising the actors' awareness of and acceptance of innovative research results (here risk control measures/NHRM) based on the novel Research-Integration-Utilization (RIU) model. The researchers involved in applied research projects could use this road map to link actors from praxis, like public administration, sectoral agencies, infrastructure, and (public) service providers or interest groups (including NGOs and SMEs at the local-to-international level) with the scientific information from their research. Using scientific information to raise awareness of and acceptance for science-based action in NHRM hits the actor's decision sphere and might have multiple impacts on other actors. The implementation of a new risk management strategy, for example, often needs the cooperation and agreement of one or more actors who are able to execute influence on that strategy. Undoubtedly, the scientific information has to be useful for at least one of these actors, which is an essential pre-condition of awareness-raising. Starting from here, it is important to clarify what are the differences and links between awareness and acceptance crucial, for successful knowledge transfer processes.

Inducing change in the NHRM requires that stakeholders first become aware of the novel scientific information and think of the utility of this information from the aspect of their own interests. In other words, **awareness** is an information-based process of thinking and intention (Wachinger et al., 2013, p.1051) which ends with an evaluation of possible influences of measures (e.g., installing a snow fence in forest stands to mitigate avalanche risks) in regard to the actor's own interests (e.g., efficient timber harvesting for the forest owner). In the second step, the actor is judging own capabilities to act and may also activate these capabilities. **Acceptance** is accordingly a twofold process of (i) thinking about the capability of an actor to prevent, to foster, or to be neutral concerning the particular NHRM measure that is considered an effective plus (ii) the activation of these capabilities through the real action. These real actions may include changes in the ecosystem, influences on the provision of different Ecosystem Services (ES), or changes in the behavior of actors (GreenRisk4Alps Project Report, 2019a). As such, acceptance is also a power-driven process that rests upon the three elements of power – coercion, incentives, and dominant information (Krott et al., 2014). They make acceptance be in a complex, non-linear relationship to awareness (Haynes et al., 2008; Miceli et al., 2008; Wachinger et al., 2013) and shape it respectively.

Following the RIU model, a promising approach for raising actor's awareness of and acceptance for innovative NHRM measures is to activate one or more power elements of stakeholders. Risk communication scholars and experts agree that two factors are particularly influential on success: (i) the trust of actors in authorities or experts and (ii) direct or indirect experiences of actors with natural hazards or risk communication (Bunting et al., 2008; Wachinger et al., 2013). In addition to that, the RIU model adds social relations and their power-related features. Power is visible in the form of dominant information, for example, when one actor (i.e., a forest authority or expert) is able to influence another actor's will by using information that the latter cannot verify (Krott et al., 2014).

The current road map is meant for the researchers in any stage of their applied research projects and should help them to either raise actor's awareness of NHRM scientific information in general or to trigger actor's acceptance for implementing innovative NHRM measures in particular. For the reader's orientation, we explain the main steps in the process of transferring scientific knowledge to praxis

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(Chapters 2 - 5). All steps (orange and blue boxes) are then summarized in a concise illustration at the end of the road map (Chapter 6).

2. Facilitating the implementation of ecosystem-based risk management strategies by stakeholder analysis and involvement

Natural hazards affect a broad set of actors who hold a (direct or indirect) stake in NHRM. Innovative risk mitigation strategies can only be implemented if these stakeholders are willing to adapt their current natural hazard risk management and/or reshape their existing policy tools. GreenRisk4Alps encouraged the implementation of innovative NHRM strategies by:

- A** • Drawing researchers' **Attention** to stakeholders

- L** • **Linking** scientific information with stakeholders inside integration forums.

The following road map should provide a general guideline to the researchers of GreenRisk4Alps and other applied research projects dealing with NHRM on how to organize the transfer of scientific knowledge into the praxis successfully. This road map is based on the novel RIU model for knowledge transfer (Böcher and Krott, 2016b) and on the conducted research activities in the GreenRisk4Alps project.

3. Drawing researchers' attention to stakeholders

3.1 Ecosystem Services and stakeholder roles in the Natural Hazard Risk Management

Ecosystem Services (ES) are 'the direct and indirect contributions of ecosystem structures and functions [...] to human well-being' (Burkhard et al., 2012; Burkhard and Maes, 2017; Groot et al., 2010). These contributions indicate the benefits that people obtain from ecosystems (Chopra, 2005, p.53). In regard to Natural Hazard Risk Management in the Alpine Space, we used an ES classification with four classes (Millenniumassessment.org, 2005): (i) regulating services such as green prevention from natural hazard risks; (ii) provisioning services such as wood provision or game provision; (iii) supporting services such as biodiversity or habitats; (iv) cultural services such as outdoor recreation, aesthetics of cultural landscapes or tourism.

Out of the four above classes, we selected 12 ES relevant for NHRM in the Alpine Space (GreenRisk4Alps Project Report, 2019b). They gave us the first link to the individual or collective stakeholders that might be affected by the ES provision. This ES perspective builds up necessarily on actors who have a stake in the issue of NHRM. This NHRM issue is linked to achieving their goals, objectives, or conditions to which specific ES can contribute (van Oudenhoven et al., 2012). Both user and regulator can benefit or influence ES in different ways: (i) by direct use, primarily by harvesting, consuming, and even producing services (Grunewald and Bastian, 2015, p.43) or (ii) by indirect influence, exerted (McGinnis and Ostrom, 2014, p.6) through the decision-making system (for instance by elections). Governmental actors themselves are responsible (by their mandate) for the public task of managing, maintaining, restoring, or distributing ES related to NHRM. These tasks become constitutive for the social role of regulators and link them to various collective stakeholders, whose specific goals, objectives, or conditions result in a variety of ES-related interests. Regulator's influence is visible directly in the ecosystems and their services or indirectly as a consequence of changing the

behavior of users (which is more frequent), i.e., for NHRM by providing subsidies for forest management protection or enforcing regulations on hazard zone plans. Normally, regulators receive their mandate as a result of formal institutional settings (Felipe-Lucia et al., 2015, 14). The social role which a stakeholder has, influences the formation of its interests and limits the available sources and/or political instruments to enforce the own interests in decision-making processes.

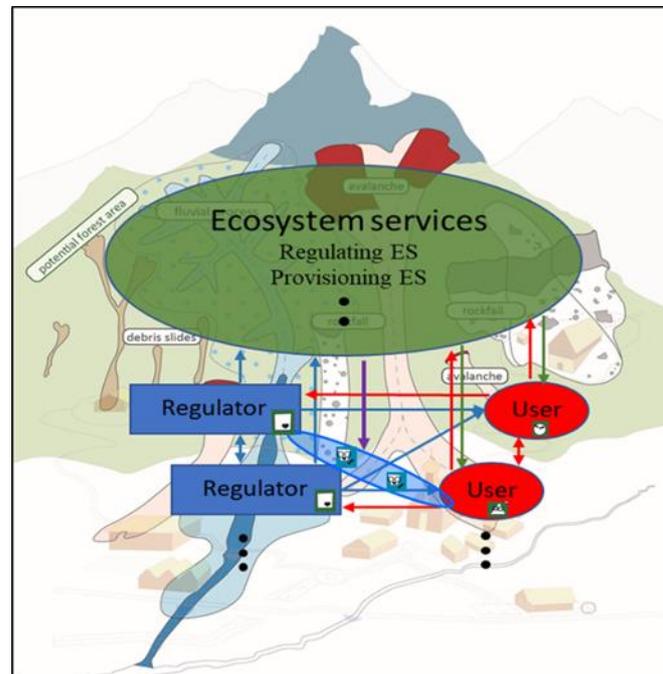


Figure 1: Stakeholder roles in NHRM. Own figure based on: Karl Kleemayr (2019), Austrian Research Centre for Forests (BFW), Department of Natural Hazards, GreenRisk4ALPs – www.alpine-space.eu/projects/greenrisk4alps/en/home.

The above graphic, which is on the one side based on the affected area in the field of the three natural hazards - avalanches, rockfalls, and landslides - reflects the ES approach adapted for the GreenRisk4Alps project (Figure 1). This graphic reveals the two different social roles of stakeholders - user (red) and regulator (blue) - and possible ways of stakeholder influence on NHRM. In Figure 1, the role of science is not visualized, but it includes the provision of innovative NHRM strategies to regulators and/or users. Those can accept (or reject) this scientific information, and after merging it with their existing knowledge and experience, the new knowledge emerges (Stevanov, Krott, 2021), which is used to enforce their own interests.

A1

- **Bring to mind different social roles that a stakeholder can have (here: users and regulators) and how a stakeholder in each of these roles can influence NHRM**

- Stakeholders social roles are described in GreenRisk4Alps report D.T2.3.1 (GreenRisk4Alps Project Report, 2019b)

3.2 Social-Network-Analysis for the identification of stakeholders and assessment of their interests

Stakeholders (individuals, groups, or organizations) interact based on their social roles - here, regulators and users. These actors' influence on one another is pointed out in the Social-Network-Analysis (SNA) (Freeman, 2004). The SNA identifies and maps stakeholders (3.2.1), describes and D.T4.4.1 Report on 'Report on Road map for decision targeted communication of green risk management'.

analyses their interests (3.2.2), points out the conflicts between actors (3.2.3), and illustrates the power relations among stakeholders (3.2.4). These four aspects of pre-analysis are used to support the knowledge transfer process based on the RIU model within the GreenRisk4Alps project.

3.2.1 Identifying and mapping the stakeholders

Actors who were already affected (Lupo Stanghellini and Collentine, 2008, p.317) or can potentially affect NHRM by direct or indirect means are considered stakeholders (in the field of NHRM). Stakeholders have different roles within the society (regulators, users), and they are embedded into institutional settings that shape their behavior and action (North, 1992, p.3). These institutional settings consist of: (i) legally binding laws; (ii) legally non-binding instruments; (iii) norms, rules, and traditions of the society; (iv) institutions (like ministries, regional governments, or municipalities) and (v) organizational and functional dimensions of regulators and users. An example in Table 1 shows the number of stakeholders (regulators and users) identified and mapped in six PARs (Slovenia - Kranjska Gora, France - Parc des Baronnies Provençales, Italy – Southern Wipptal, Italy – Val Ferret, Austria - Vals/Gries am Brenner, Germany – Oberammergau/Ettal) of the GreenRisk4Alps project.

A2

- Identify who is affected or can affect NHRM (take into account different roles of stakeholders and their institutional setting)
- Map stakeholders (in the case of a large number, group them according to the common characteristics)

- Identification and mapping of stakeholders In GreenRisk4Alps is presented in report D.T 2.2.1, D.T.2.2, D.T.2.3.1 (GreenRisk4Alps Project Report, 2019a, 2020a, 2019b)

PAR	Identified and mapped actors by the categories of:		
	Regulator	User	Total
Val Ferret (Italy)	22	10	32
Kranjska Gora (Slovenia)	6	5	11
Oberammergau/Ettal (Germany)	6	24	30
Parc des Baronnies Provençales (France)	7	6	13
Southern Wipptal (Italy)	10	14	24
Vals/Gries am Brenner (Austria)	29	9	38
In total	80	68	148

Table 1: Number of identified stakeholders within GreenRisk4Alps per PAR and specified by stakeholders roles.

3.2.2. Describe and analyze the interests of stakeholders

Interests are the driving force of actors' actions. Interests are "based on action orientation, adhered by individuals or groups, and they designate the benefits the individual or group can receive from a certain object, such as a forest" (Krott, 2005; ALTERFOR Project Report, 2018, p.30). The analysis of interests is based on the stakeholder's goals, objectives, or conditions (advocated up to present) to which specific ES can contribute. These ES can influence NHRM (GreenRisk4Alps Project Report,

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2019b), their represented social role (regulators or users) which is strongly connected to the institutional setting. Different stakeholders' interests that influence NHRM range from material interests, like wood provision, to non-material and intrinsic driven interests, such as the aesthetics of alpine landscapes. They all become visible in practical actions of stakeholders, and they need appropriate measurement and scale for their analysis, like the ES approach (GreenRisk4Alps Project Report, 2019b).

A3 • Think about an applicable unit of measurement and scale to evaluate interests, e.g., ES

- How to evaluate actors' interests is presented in report D.T 2.3.1 (GreenRisk4Alps Project Report, 2019b)

3.2.3 Point out the conflicts between actors

Conflicts of interest appear in multiple-stakeholder settings, while each stakeholder tends to enforce its own interests. On one hand, limited resources lead to conflicts, i.e. on different ES, due to the fact that interests cannot be fulfilled simultaneously for relevant actors (Hubo and Krott, 2010, pp. 219-220). On the other hand, normative and moral acting orientations might be the basis for specific interests because actors have different values and beliefs (Aubert, 1963, p.27). They can get in conflict with other actors' attitudes when the resulting interest claims the usage of an ES. To foster the knowledge transfer process, the conflicts have to be carefully considered because the new science-based solutions might have the capacity to support conflict regulation (Beierle, 1999, p.81).

A4 • Identify and analyze existing conflicts between stakeholders influencing NHRM

- Examples of conflicts in NHRM can be found in report D.T 2.5.1 (GreenRisk4Alps Project Report, 2019c)

3.2.4 Illustrate the power relations of stakeholders

"Science plus power" is a strong driver for the knowledge transfer processes. The RIU model takes into account that the more powerful actor is able to introduce scientific rationale into praxis even against the resistance of other actors (Böcher and Krott, 2016a, p.163). The power dimension might exist in all different situations and the contribution of research results to regulate conflicts or support interests. We apply actor-centered power as a social relationship, in which actor A alters the behavior of actor B without recognizing B's will (Krott et al., 2014, p.37). Power itself is invisible, but it occurs in different sources of the potentate (actor A) that he will apply to change the subordinate's behavior (actor B). These sources make power observable and allow us to assess the power of an actor. We evaluate power on the ability of an actor to apply these sources (coercion, incentives, and dominant information) within NHRM.

A5 • Estimate what power sources stakeholders can use to influence NHRM

- Power sources, their related features, and examples are explained in report D.T 2.5.2 (GreenRisk4Alps Project Report, 2019c)

4. Link scientific information with stakeholders in integration forums

The RIU model consequently follows the theoretical assumptions of interest-driven actors having different power capabilities to enforce their interests in praxis. Additionally, RIU emphasizes an independent phase of integration, which is between science and praxis and enables both to exchange information (Böcher and Krott, 2016a, p.23; Juerges and Krott, 2018, p.53). Therefore, science and praxis can only encounter within the integration phase. To link the most interested and powerful stakeholders with relevant scientific information, applied research projects need practical recommendations such as the present step-by-step guideline.

4.1 Prioritise stakeholders and scientific information from the project

Identifying powerful actors who might have an interest in the GreenRisk4Alps results have to be based on the pre-analysis (briefly described in chapter 3 of this road map). Three parts of the pre-analysis – the social network analysis (GreenRisk4Alps Project Report, 2020a), the interest analysis (GreenRisk4Alps Project Report, 2019b), and the power source analysis (GreenRisk4Alps Project Report, 2019c) - were used to select actors with medium or strong interests in regulating and provisioning Ecosystem Services (ES) and to estimate their power means. Building on this, the first set of so-called promising actors has to be identified, and out of it, the specific actors could be selected in the next step. This selection takes place concerning both the (i) existence of actor's power means to implement ecosystem-based solutions for natural hazard mitigation in praxis (GreenRisk4Alps Project Report, 2019c) and (ii) actor's interest in the project results (GreenRisk4Alps Project Report, p.9). It means that powerful actors would be selected only if the project results can be tailored to their estimated scope of interests. Both processes, the selection of actors and the selection of research results, required coordination between the GreenRisk4Alps researchers from different disciplines, including forest scientists, geologists, geographers, forest-policy scientists, and programmers.

The coordination process between project scientists is a (hypothetical) procedure for information exchange. Social scientists provide information about promising actors, their interests, power sources, and conflicts of interest to their project partners, typically natural scientists. This multi-lateral exchange process is useful for all researchers in the (interdisciplinary) consortium because it connects research results with the real problems and needs of actors from praxis (Böcher and Krott, 2016b, p.3). Scientists often have limited notions of how to relate their research results to praxis or political decision-makers. Consequently, the large amount of research results they have produced remains a challenge for them. They often have doubts about what specific information to focus on in the integration phase. To overcome this shortcoming, the coordination process has to be used in research projects to provide an opportunity to identify relevant points for researchers. Here, the selection of research results, depending on the characteristics of the stakeholders identified in the pre-analysis, has to be carried out. Within the coordination process for selecting targeted scientific information, conflicts should be considered, because stakeholders strive to manage such conflicts (Beierle, 1999, p.81) concerning their own agenda. Therefore, this situation might be a strong driver of the knowledge transfer process.

L1

- **Prioritize stakeholders for knowledge transfer (based on the pre-analysis)**
- **Organize coordination process within your interdisciplinary research consortium (between natural and social scientists)**
- **During the coordination process, connect scientific information of your project with stakeholders prioritized by using the pre-analysis.**

- Prioritizing of stakeholders and the coordination process is explained in report D.T 4.1.1, D.T 4.2.1, and D.T 4.3.1 (GreenRisk4Alps Project Report, 2020b, 2020c, 2021)

4.2 Integration forums: the place for stakeholder involvement

An important point in the knowledge transfer process is to identify where stakeholders get scientific information systematically. In these specific locations and occasions, e.g., permanent expert group, all activities related to integrating the scientific information into the stakeholder praxis should be executed. The project information, within these locations and occasions, should address stakeholders that are prioritized (see above). Such integration forums are places, in formal or informal settings, where practitioners and political actors meet in order to exchange scientific information (Kirchner and Krott, 2020, pp. 451-452). For that, the forum has to have a link to science. The exchange of scientific information takes place inside the integration forum and its actors' composition. The latter is characterized by already existing power relations. Therefore, the exchange process is mainly driven by the most powerful actors. The GreenRisk4Alps (or any other project) can become active in selecting stakeholders to engage with (as allies) while choosing already existing integration forum (e.g., advisory boards linked to a government or departmental research) or by creating the new one (e.g., round tables organized by the project) while considering stakeholders' interests and power capabilities (GreenRisk4Alps Project Report, 2020b).

4.2.1 Identification of integration forums

To identify integration forums, the data gained by the pre-analysis may be helpful. Additionally, specified questions about the topic, observations and processes that are already known from other research projects or knowledge about formal procedures (required by the law) at different administrative levels are helpful. One example of a formal procedure required by the law is the reformulation of hazard zone maps in Austria on the municipality level (Austrian regulation on hazard zone maps, 1976). Links to suitable (new) forums can also be identified by observing and analyzing the discussions inside the existing actual forums, in which researchers are participating in some other issue. In principle, integration forums at all administrative levels can be used to target actors with specific scientific information generated by the project.

L2

- Identify integration forums on all administrative levels

- The identification of integration forums for NHRM is revealed in report D.T 4.1.1, D.T 4.2.1, and D.T 4.3.1 (GreenRisk4Alps Project Report, 2020b, 2020c, 2021)

4.2.2 Types of integration forums

There is a great variety of potential integration forums. In order to classify them, the point of view of the project is crucial. The first type, an "existing forum," has a link to science, and it is known by the project. A "hybrid forum" is a forum that might already exist but is unknown to the project yet. It may already have an established link to science or the link established by the project. A "new forum" has to be established by the project. Because of that, it will already have a link to science, but this link has to be embedded into a group of actors from praxis. It is either key actors or participating actors (Table 2) that can grant the researchers access to a specific forum in praxis. The following table 2 summarizes the three types of integration forums with their main characteristics and examples.

<i>Integration forums</i>			<i>Actors</i>		
<i>Type of integra-</i>	<i>Definition</i>	<i>Example of the</i>	<i>Key actors</i>	<i>Participating actors</i>	<i>Target actors</i>

<i>tion forum</i>		<i>integration forum</i>			
Existing	A forum that exists, has a link to science and is known by the project	<ul style="list-style-type: none"> • Advisory boards • Juris-prudence 	<ul style="list-style-type: none"> • Departmental research • Expertise 	Actors selected by forum or key actor	Actors selected by the forum, key actor, or participating actor
Hybrid	A forum that might be already existing; a link to science may exist or might be yet established, but the forum is unknown to the project yet	<ul style="list-style-type: none"> • Bilateral discussion 	<ul style="list-style-type: none"> • Professional authorities • Decision-makers 		Actors selected by a key actor
		<ul style="list-style-type: none"> • Expert rounds • Ad-hoc task forces 	<ul style="list-style-type: none"> • Responsible authorities • Internal/external experts 	Actors selected by a key actor	Actors selected by a key actor or participating actor
New	A forum that does not exist but might be established by the project and might develop a link to research by the project	<ul style="list-style-type: none"> • Workshops • Round tables 	<ul style="list-style-type: none"> • Researcher 	Actors selected by the researcher	Actors selected by researcher or unspecified entity

Table 2: Types of integration forums based on: Kirchner and Krott, 2020, p. 453.

L3

- Choose an appropriate integration forum for prioritized stakeholders and scientific information
- Get access to the integration forum by key actors or participating actors

➤ Examples of integration forums for NHRM can be found in report D.T 4.1.1 (GreenRisk4Alps Project Report, 2020b)

5. Rising actor’s awareness of and acceptance for NHRM research results in while meeting their interests by targeted scientific information

This road map is designed for (i) the GreenRisk4Alps project researchers and (ii) all other applied research projects dealing with NHRM having the aim to raise awareness and acceptance for their produced scientific results. To reach this aim, communication from science to praxis is an essential part that can contribute to implementing innovative risk mitigation measures in praxis. This science-praxis communication can intervene into the four main hazard cycle phases (prevention-preparation, warning, emergency response, and recovery-reorganization) in risk management and link them (Steinführer et al., 2009; Lindell and Perry, 2004). That process is underpinned by data gained from a sound pre-analysis. Pre-analysis includes social-network-analysis, interests, conflicts, and power analysis, and as such enhances the communication process.

According to the RIU model, the communication of scientific information has to meet and support stakeholders' interests. This is more likely to happen when more awareness for innovative NHRM strategies is created. Even though awareness remains within the sphere of thinking and intention only, it includes an epistemic part (Böcher and Krott, 2016b, p.164), which is one prerequisite for triggering a change in thinking and also in stakeholders’ acting.

Acceptance includes awareness. However, it also asks for other two parts into the viewpoint - stakeholders' power sources and conflicts (both handled by the pre-analysis). Focussing on acceptance as a power-driven process, stakeholders' social relations appear crucial for any science-based information of an applied research project to get into the utilization sphere. The RIU model subsumes power as the driving force for the knowledge transfer while picking up power relations already within the integration stage, i.e., by integration forums, where practitioners and politicians meet with researchers to exchange scientific information. By showing how to use different integration forums, select appropriate ones according to stakeholder composition, and bring targeted scientific information into it, this road map aims to increase acceptance for new science-based risk reduction strategies.

6. Graphical summary of the road map and to-do list for research projects to gain awareness and acceptance of scientific information for NHRM

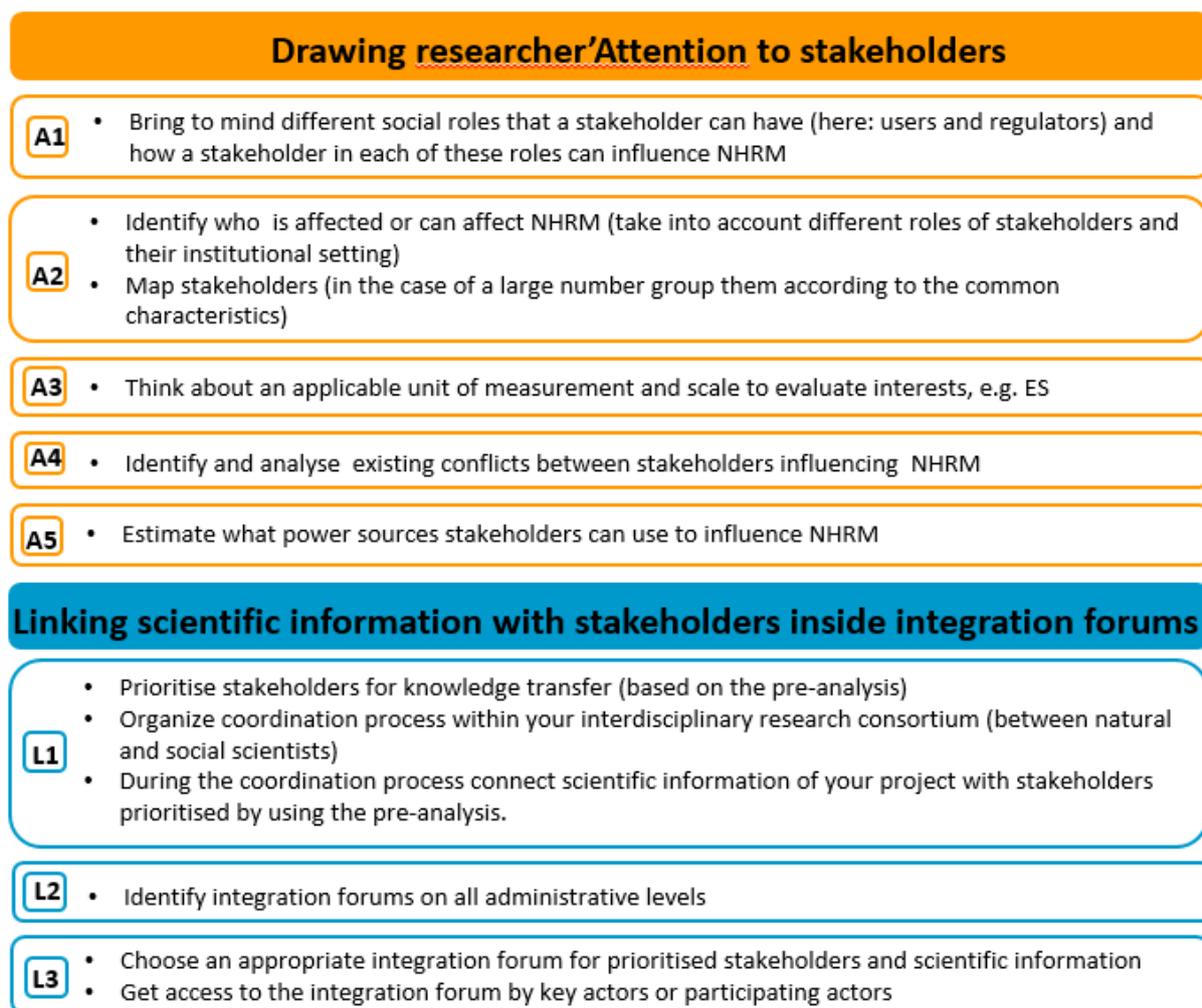


Figure 2: Graphical summary of the road map –To-do list for research projects

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