D.T2.5.2 Report on 'Conflicts and influences on acceptance for ecosystem-based risk management in the AS'

GREEN RISK 4 ALPS

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Göttingen, December 2019.

Activity: T2-ACTINA objectives are: i) to provide the socio-economic foundation of an ecosystem-based risk mgmt. in the AS, considering the increase of risks of natural hazards by: systematic stocktaking of all relevant actors; identifying decision and resonsibility structures; identifying conflicts, awareness of issues and acceptance of action alternatives; ii) to map the adjacent interests, values and costs. T2 supports WP3 and WP4 with the necessary information on actors, interests and conflicts.

Activity A.T2.5	Awareness, acceptance and conflict analysis (AAC) analysis	2019.01	2019.12
Activity 2.5 carries out in-depth analysis of existing awareness, acceptance and conflicts by means of questionnaires, interviews and – if necessary – workshops. Experiences of previous projects demonstrate the importance of an AAC-analysis and for implementing the acceptance and their drivers, as they are of highest importance (and not only 'risk values'). Activity T2.5 determines the fundamentals for accepting risk alternatives, yielding the starting point for T4 (acceptance raising).			
Deliverable D.T2.5.2	Report on 'Conflicts and influences on acceptance for ecosystem-based risk management in the AS'		1,00
Questionnaire and interviews of acceptance for ecosystem-based risk mitigation measures and mitigation alternatives will give a first innovative overview of factors influencing acceptance; survey on conflicts and awareness of the GR4A-issues in the PAR			

ACTIVITY T2.5 – Activity objective

Activity 2.5 carries out a deep analysis of existing awareness, acceptance and conflicts in risk management by means of questionnaires, interviews and – if necessary – workshops. Experiences from previous projects show the importance of an AAC-analysis which is the basis for the implementation and acceptance (and not only 'risk values'). Activity T2.5 determines the fundamentals for accepting risk alternatives, yielding the starting point for T4 (acceptance raising).

ACTIVITY T2.5 – State of the Art and previous projects

Conflicts are a result of different interests of actors in ecosystem services (ES), which cannot be fulfilled at the same time. Due to the focus of the GR4A project on actors, we follow an analytical, theory-based and empirically applicable framework for assessing actors' power. Several studies have applied the actor-centred power approach in differently developed and developing countries for land use issues. Actor-oriented power analysis includes structures, rules and arrangements, creating the power source of an actor. The actor makes use of this power source to regulate a conflict according to his interests. Acceptance and awareness about ecosystem-based risk mitigation measures and mitigation alternatives depend on the interests of actors while the implementation process is highly driven by the power sources of actors. The analytical framework is currently applied in the European Union's Horizon 2020 project ALTERFOR[1]. Our contribution to GR4A is built on the experiences of ALTERFOR.

ACTIVITY T2.5 – Methods applied in GR4A

This report is based on a triangulation of qualitative data (document analysis, participatory observations, qualitative interviews with selected key actors) in all PAR`s (Pilot Action Region). The data for PAR has been compiled by interviews with experts in the field of risk management, land use management and forest management on different levels of the decision-making structure in cooperation with other work packages.

[1] Alternative models and robust decision-making for future forest management (https://alterfor-project.eu).

ACTIVITY T2.5 – GR4A Analysis

The analysis consists mainly of a qualitative description of the five PAR networks concerning their decision-making structures. Additionally, we provide a comparison of the actor composition, roles and influences that consider different decision-making and involvement levels for the five PAR.

GreenRisk4Alps Partnership

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LWF - Bavarian State Institute of Forestry (GER)

MFM - Forestry company Franz-Mayr-Melnhof-Saurau (AT)

SFM - Safe Mountain Foundation (ITA)

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UGOE - University of Göttingen, Department of Forest and Nature Conservation Policy (GER)

WLS - Swiss Federal Institute for Forest, Snow and Landscape Research (CH)

WLV - Austrian Service for Torrent and Avalanche Control (AT)

ZGS - Slovenia Forest Service (SLO)

Deliverable D.T2.5.2 - Report on 'Conflicts and influences on acceptance for ecosystem-based risk management in the AS'

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1. Linking awareness and acceptance with actors and power

Based on the deliverable D.T2.3.1 'Comparative decision structure analysis in the PAR' we identified and examined the interests of relevant actors in each PAR in the GreenRisk4Alps project. Interests are the driving forces of actors to act in the real world (Krott, 2001, pp. 5-6) and thereby the real motivation for the participation at the decision-making process. Here, they can advocate their own interests and influence decision making which will be able to affect the own interests of actors. Actors need to know which interests they have and how they could be affected, e.g. indirectly by decisions of regulators or directly by practical acting in the ecosystem of other users. For this evaluation process, actors require a lot of foreknowledge and additional information about relationships in nature or interrelations with the socio-ecological system. This allows actors to evaluate the possible effects, for instance of a new green prevention strategy, on other important ES in their interest sphere or about costs of alternative technical protective measures. The existing knowledge and information of actors will be connected with the interests of actors and leads to a specific level of awareness for each problem. Both, the understanding of influence on own interests as well as the level of influence, positive or negative or neutral, determine the level of awareness of an actor to an issue or to an alternative risk management strategy. In this way, an integration strategy has to take into account actors' awareness levels of issues to establish a tailored strategy for successful knowledge transfer with relevance to actor's needs. Actors' attention directly focusses on themselves and all activities of integrators focus the attention onto the actors' perspective. An increase of awareness is possible through (i) provided new information for actors; (ii) enhancement of foreknowledge of actors; (iii) knowledge about the interests and power sources of actors during the integration process where integrators can optimize the knowledge transfer process. To sum up, raising awareness is to consider interests and to deliver additional information connected to interests of relevant actors.

The implementation of certain new risk management strategies often needs the agreement and cooperation of one or more actors who are able to execute influence on it. Differently to the awareness of actors on issues, this process directly links to real actions, measures and influences, e.g. changes in the ecosystem, changes in the behavior of actors, influences on different ES. Whereas awareness is a process of thinking which ends with an evaluation of possible influences of measures in regard to the own interests of an actor, acceptance is a process of thinking with respect to the capability of an actor to prevent, to foster or to be neutral to concrete and effective measures plus the active use of these capabilities. First of all, acceptance is a power driven process consisting of different elements of power which will be examined in chapter 3. Secondly, acceptance directly connects to the awareness of an actor of an issue and an important requirement to increase the acceptance of an actor to a specific measure. For this background, the current report D.T2.5.2 focusses on the evaluation of power of actors. This is the second step of the successful knowledge transfer process in the GreenRisk4Alps project with regard to the RIU model and directly linked to the interest analysis done in the report D.T2.3.1. Resulting from both deliverables, we are able to establish an optimized integration strategy for knowledge transfer that considers, firstly, the examined knowledge on the interests of actors as well as knowledge on the dependencies and influences of different risk management strategies to the interests of actors and secondly, knowledge on the power sources of actors. This integration strategy will be exerted in a selected and coordinated integration process which is tailored addressed to the identified most promising allies.

2. Conflicts

Conflicts are directly linked with the will of actors to enforce their own interests caused by the acting individual's orientation. In the ecosystem, different interests of actors occur with acting individual's orientations ranging from material interests to non-material, intrinsic driven interests. They become

visible in practical acts of actors and measure in ecosystem services ES (D.T2.3.1). On the one hand, limited resources lead to conflicts 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' attitude when the resulting interest claims the usage of an ES. We assume that conflicts in natural hazard management solely occurs between benefits in ES for relevant actors as social conflicts, for instance between forest owners with strong interests in wood provision and downhill land owners who anticipates protection from forests against gravitational natural hazards. The holding of conflicts is embedded in the institutional setting and follows certain rules where the centralized bureaucratic system plays a major role (Koenig, 2005, p.77). This role is often perceived by regulators and the application of the equivalent law. Here, as well by users, the power of an actor is an important fact that empowers one actor to win the confrontation of interests. However, conflicts will be not only being regulated by the bureaucratic administration or unbalanced power relations. Instead, the regulation of conflicts does also happen when actors have the willingness for a compromise. Sometimes the object of the conflict, the ES, does not exist anymore (Stark, 2005, p.90). In this case the conflict ended. Though in the other cases the conflict does always exist further and might arise again.

2.1. Interests as drivers of conflicts

Interests of actors are widely spread and caused, as mentioned before, by different values, norms and beliefs of actors. Important values for the forest protection policy in Austria are agricultural values, hunting values, forestry values and nature conservation values about material and immaterial goods (Weiss, 1999, pp. 294-296). Whereas material needs of actors, in general, arise from a utilitarian thinking of maximizing goods, moral and normative aspects might be strong drivers for acting in an idealistic actor's perspective. The latter often implement an orientation to the general welfare of a society (Adloff, 2005, p.369) and less on actors' self-interest. This value-rational acting relates to immaterial wishes and objectives and aims for collective norms, standards and values of competitive societal tasks and purposes (Maringer et al., 1997, p.5; Böcher and Töller, 2012, pp. 99-102). Conflicts about values may not be regulated by an appropriate compensation procedure because of the indivisibility of values and norms. Therefore, conflicts with the background on a purposely rational act seem to be more realistically regulated by compensation procedures, as for example the forest reserve regulation in Austria (§ 27-31, Austrian Forest Act, 1975; Schmiderer et al., 1999). In both cases, it does not make sense to appeal to moral rationales. But new scientific knowledge, as a result of a research project like GreenRisks4Alps, might lead to new insights and a reformulation of interests due to a learning process (Weiss, 1999, p.239). Nevertheless, a change of acting orientations, such as values and norms with highest priority is hardly to be achieved quickly and likely needs decades. Such are deep core and policy core belief-systems as their main part is a relatively stable setting which determines the interests of an actor and also connects actors with the same belief-system into groups (Weiss, 1999; Sabatier, 1993, p.127)).

The visible interests of actors occur in the real actions of a specific actor or acting group in the ecosystem, e.g. in the forests or in agricultural land, where they perceive a set of different goals, objectives or conditions and where a certain ES can contribute (van Oudenhoven et al., 2012). These identified ES have to be relevant to natural hazard management in the alpine space by a direct or indirect influence on it. We measured the interests of actors in ES and evaluated it according to the applied scheme, which is explained in D.T2.3.1. From interviews and scientific literature, we identified "hidden" goals, objectives or conditions of actors which will be not officially formulated. They are also converted in ES or specific ES will be used to justify these interests. For instance, the Austrian forest

technical service for torrent and avalanche control as a public administration unit pursues the interests of budget maximizing and the security of own competences in comparison to other public administrative units, e.g. the Tyrolean provincial forest services (Weiss, 1999, pp. 228-230). In ES terms it is indirectly visible in the ecosystem in implemented technical prevention measures realized and mainly financed by the Austrian forest technical service for torrent and avalanche control. It justifies the budget and competences based on the objective to protect people, assets and the promotion of the economic development in a region as well as the maintenance costs for the technical prevention measure (Austrian Ministry of Agriculture, Forestry, Environment and Water Management., 2006, p.10; Weiss, 1999, pp. 228-230). Such interests lead to conflicts of different administrative units about budgets for improving or maintaining ES and about the extent of competences for ES and can be understood as powerful drivers of conflicts.

2.2. Conflicts between benefits in ecosystem services

The identified conflicts occur between actors based on their different priorities of diverse ES and their influences on natural hazard management. These currently existing conflicts are an expression of interactions of different ES and their related actors. For the successful knowledge-transfer process, the conflicts have to be carefully considered because of the influences the new science-based solutions, as consequences of models or applications for different hazards, might have on it. The interests of actors behind them might be affected in a positive, negative or neutral way. In collaboration with natural scientists', social scientists have to evaluate which effects the applied research results will have on the different ES, which actors will be concerned and how current conflicts will be effected. This process combines the knowledge of the different scientific disciplines and includes the result of the social sciences: (i) the social network analysis D.T2.1.2 and D.T2.2.2, (ii) the interest analysis D.T2.3.1 and (iii) the power sources analysis D.T2.5.2 of the present report. For the latter, it will be conducted in detail in chapter 3 of this report. We will get first hints to the power constellation due to the existing conflict situation, its history and the currently existing regulation of the conflict. For the following occurred conflicts, we got empirical evidences during the conducted research activities.

ES	***Conflict***	***Involved actor categories***

Green prevention	• Green prevention vs. wood provision
	• Certain authorities prefer different prevention measures due to uncertainties of long/short term occurrence of efficacy
	• Reduction of game densities to avoid damages:
	  ○ Damages of young stands in protection forests by browsing, debarking, and damages by footsteps vs. hunting interests
	  ○ Demixing of tree species by game species vs. green prevention by mixed stable stands
	• Rambling areas of game species
	• Financial compensation for forest owners for green prevention measures
	• Compensation for closed forest interventions
		• Forest owner
		• Municipalities
		• State agencies for forests
		• State agencies of risk protection
		• Environmental actors
		• Hunter
		• Alpine grazing/ agriculture

Technical prevention	• Different responsibilities of authorities for technical/green prevention • Secure settlements vs. effectiveness / cost efficiency of measures • Secure critical infrastructure (traffic, energy transition, supply) vs. effectiveness / cost efficiency of measures • Effectiveness / cost efficiency of technical prevention vs. other prevention measures	• State agencies of risk protection • Forest owner • Municipalities • State agencies for forests • Environmental actors • Provider traffic infrastructure • Consumer – traffic Infrastructure

	• Disturbance of alpine agriculture in high mountain areas (cutting hay, to tend sheep and cattle) • Impairments of landscape and scenery vs. protection against natural hazards • Impairments of habitats vs. protection against natural hazards • Intervention in the autonomy of the owner by implementing artificial structures • Extent of the compensation by interventions	• Consumer in endangered zones • Alpine grazing / Agriculture • State agencies for traffic, infra-structure, spatial planning, regional development
Reduction of land use in risk zones	• Intervention in the autonomy of the owner • Decreasing risks vs. reduction of assets (land, houses) • Decreasing risks vs. unlimited access to nature	• State agencies of risk protection • Environmental actors • Containment / blue lights • State agencies of environment

Wood provision	• Wood provision vs. green protection
	• Extent / declaration of productive forests vs. protective forests
	• Forest management in production forest vs. in protective forests
	  ○ Different yearly cutting rate
	  ○ Amount of subsidies for (non-) harvesting wood in protective forests
	  ○ Amount of subsidies for thinning in protective forests
	  ○ Amount of subsidies for afforestation measures in protective forests
	• Game densities
	  ○ Damages of young stands by browsing, debarking, and damages by footsteps
	  ○ Demixing of tree species by game species
	  ○ Hunting periods
	• Restricted rambling area of game species vs. unrestricted rambling
	• Achieve income by wood provision vs. achieve income by hunting tenures
	• Energetic wood use vs. material wood use
		• Forest owner
		• Municipalities
		• State agencies for forests
		• State agencies of risk protection
		• Citizen
		• Environmental actors
		• Hunter
		• State agencies of environment

Game provision	• Game densities
	  ○ Hunting management plans
	  ○ Hunting regulations
	• Unrestricted rambling of game species vs. restricted rambling
	• Hunting interests vs. interests of outdoor recreational user (skiing, hiking, climbing, biking, …)
	• Traditional hunting behavior vs. economic driven hunting due to forestry interests
	• Hunting executed by local hunters vs. non-local hunters
	• Prioritization of hunting as income source for forest owners vs. hunting for forestry interests / green prevention interests / ecological interests (multifunctional use of forests)
	• Reorganization of hunting areas
		• Hunter
		• Forest owner
		• Municipalities
		• State agencies for forests
		• State agencies of risk protection
		• Environmental actors
		• State agencies of environment

Grass for feeding	• Adequate area for alpine grazing vs. afforestation on alpine pasture land • Forest pasture vs. economic and protective interests in forests	• Alpine grazing / Agriculture • State agencies of risk protection • Forest owner

	○ Cease of forest pasture vs. maintenance of forest pasture • Number of livestock in a certain area vs. green prevention interests or forestry interests •	• Municipalities • State agencies for forests • Environmental actors • State agencies for agriculture
Biodiversity and Habitats	• Allow natural development of forests vs. management of forest for wood provision or green prevention • Implement nature protection areas • Secure endangered and seldom habitats vs. other land use (technical prevention, green prevention, forestry, alpine grazing)	• State agencies of environment • Environmental actors
Aesthetics of cultural landscapes	• Holding on traditional landscapes and scenery vs. protective and economic interests • Holding on traditional landscapes and scenery vs. economic and societal changes • Rural and agricultural values vs. economic agricultural values • Landscapes and scenery as a result of traditional agriculture and forestry vs. changes in land use	• Consumer in endangered zones • Producers in endangered zones • Environmental actors • State agencies for agriculture • Citizen
Tourism	• Landscapes and scenery as product for tourism vs. other interests in land use • Good access for tourists to attractive tourist destinations (hotels, sightseeing hotspots, touristic infrastructure, …) • Increasing number of tourists vs. risk mitigation against natural hazards ○ Free access to the endangered valley to create revenue from tourism vs. municipality responsibility to protect people against natural hazards	• Consumer in endangered zones • Producers in endangered zones • Environmental actors • State agencies for agriculture • Citizen • Alpine grazing / Agriculture
Outdoor recreation	• Unlimited access to nature – biking, hiking, geocaching, ski touring, climbing: ○ vs. nature conservation interests ○ vs. hunting interests ○ vs. other land use - alpine grazing, forestry ○ vs. safeguarding obligations of forest owners or blue lights authorities ○ vs. municipality responsibility to protect people against natural hazards • Good infrastructure for outdoor activities vs. habitat protection • Increasing number of recreational users vs. nature conservation interests and land use	• Consumer in endangered zones • Producers in endangered zones • Environmental actors • State agencies for agriculture • Hunter • Citizen • Alpine grazing / Agriculture • Municipalities

Table 1: Examples of relevant conflicts in natural hazard management in the PAR Brenner region

As the table above summarizes, natural hazard management is characterized and linked to multiply conflicting interests of actors. Different levels of involved actors at the local, regional or national level as well as the complexity of the ecosystem and the existing interrelations of ES could result in an intensive conflict. Such intensive or main conflicts are visualised on the 'evaluation of interests' from D.T2.3.1 in the following figure 1 for the example of the PAR Brenner region in Austria.

Regulator													Interest in	Alternative risk strategies (%)	User							
Containment/ blue lights	Risk Transfer		Media	Construction-companies	State agencies							Municipalities			Forest-owner	Consumer in endangered zones	Producers in endangered zones	Consumer – traffic Infrastructure	Provider traffic Infrastructure	Environmental actors	Citizen	Alpine grazing/ agriculture	Hunter
	Private	Public			Financing	Protection of risks	Forests	Environment	Agriculture	Traffic, infrastructure, spatial planning, regional development	Hunting												
													Regulating ES									
+	-	++	++	0	+	++	++	-	+/-	++	-	+	Green prevention	0 - 100	+/-	++	++	++	++	++	++	+/-	0
++	-	++	++	++	+	+++	++	--	+/-	++	0	+++	Technical prevention	0 - 100	0	+/-	+	+++	+++	-	++	-	0
+++	-	++	++	0	0	+	0	++	0	--	0	---	Reduction of land use in risk zones	0 - 100	+/-	---	---	---	---	+	---	-	0
													Provisioning ES									
0	0	0	0	0	+	0	++	0	--	+	+/-	0	Wood provision	0 - 100	+++	0	+	0	0	0	++	--	--
0	0	0	0	0	0	--	--	0	0	0	++	0	Game provision	0 - 100	++	0	0	0	0	-	0	0	+++
0	0	0	0	0	+	--	0	0	+++	+	+/-	0	Grass for feeding	0 - 100	-	0	0	0	0	0	+	+++	+
0	0	0	0	0	0	++	++	++	++	+	0	+	Water provision	0 - 100	++	+	+	0	0	+	++	++	0
													Supporting ES									
0	0	0	0	0	0	0	+	++	+	+/-	+	0	Biodiversity	0 - 100	+	+	0	0	0	++	+	+	+/-
0	0	0	0	0	0	0	0	+++	+	+/-	+	0	Habitats	0 - 100	0	0	0	0	0	+	+	+	+
													Cultural ES									
0	0	0	0	0	0	0	+	++	++	0	0	++	Aesthetics of cultural landscapes	0 - 100	+	+++	++	0	0	++	++	++	+
0	0	0	0	0	+	+	0	-	+	++	0	++	Tourism	0 - 100	-	+++	+++	0	0	++	+/-	+/-	0
0	0	0	0	0	0	0	0	-	0	0	-	++	Outdoor recreation	0 - 100	-	+++	++	0	0	++	++	+/-	-

Figure 1: Main conflicts in ES in the PAR Brenner region (Austria)

Therefore, interest conflict regulation in natural hazard management might be an expensive process with regard to resource input and is justified by the political goals (Himmler et al., 2011, p.33) as well as the preferred political instruments. These range from legal prohibitions, the state supervision of forests, consultation of forest owner and hazard zone planning to financial support, for instance to maintain mountain agriculture, increase high alpine afforestation or for flood on the municipality level. The intervention is based on two different effects in social actions, firstly, on information and secondly, on power. Conflicts could be regulated through the application of both elements in three different types, (i) clarification by information to change the perception of actors (e.g. information about natural hazard and risks), (ii) information for factual solutions (e.g. multifunctional use of forests), (iii) negotiation to regulate a conflict by applying and threatening of power sources (Krott, 2001, pp. 9-11). All three types intervene directly on interests and, of course, on actors in an extend in which the information and power sources of the involved actors are available for each actor (Krott, 2001, p.13). Information and power often interact and will be applied simultaneously to regulate conflicts. Even against resistance of certain actors applying power and information may lead to a regulation of a conflict (Krott, 2001, p.11). Unbalanced power relations seem to be most promising to regulate conflicts through this mechanism. For the successful knowledge transfer we make use of both mechanisms, the power of actors and providing new information through research results.

3. Power of actors

As seen in the chapter before, power is an important factor to regulate conflicts and to enforce own interests. It exists in different social relations between various actors and in manifold societal networks (Böcher and Krott, 2016, p.163). Power will be applied to influence the actions of one or more persons, to enforce others to act in the interest of the person exerting the influence (FRENCH, 1956, p.182). Politics and society are characterized to a great extent by those power relations. The RIU model takes into account that the more powerful actor is able to introduce scientific rationale even against the resistance of other actors by using power (Böcher and Krott, 2016, p.163). “Science plus power” enables successful knowledge transfer processes exerted by actors who add power in order to force others to apply the scientific information (Böcher and Krott, 2016, p.164). The strength of the perspective of political science to knowledge transfer is that it is able to include power, as the central phenomena of this discipline (SIMON, 1953, p.500), in observable dimensions for physical, economic or social influence of an actor A over an actor B (Dahl, 1957, p.202). These dimension might be existing in any conflict, in any regulating measure for conflicts and also in the contribution of research results to regulate conflicts or to support interests.

3.1. Analytical framework

To analyse the power of actors we follow the actor-centred power concept (Krott et al., 2014). This concept is applicable for various land use issues and will be adapted for the field of natural hazard management. Actor-centred power is defined as a social relationship in which actor A alters the behaviour of actor B without recognising 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 behaviour of the subordinate (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 coercion, incentives and dominant information as the three types of power sources.

3.1.1. Coercion

Coercion defines as “altering the behavior of the subordinate by force”. This will happen by physical actions and includes the threat of force and even bluffing about force (Krott et al., 2014, p.37). Actual physical actions, for instance, evacuation of endangered houses caused by rock fall might be enforced by police when the residents do not follow the directive of the state authority. Announced or expected

physical actions may obtain the same effect. For instance, the local avalanche commission could recommend to close the road if the avalanche danger is high (Avalanche Commission Act of Tyrol, 1991). The police will execute this measure on specific streets. In the case of infringements, the police may apply coercive measures to avoid people to enter the closed street (§43, Austrian Traffic Regulation, 1960) .

Such applied or announced force, caused by a certain actor, is the basis for observations. Therefrom result physical actions that can be observed, for instance building and maintaining a fence to protect afforestation areas, running a forest guard system equipped with weapons, forbidden grazing of livestock in protective forests restauration areas unobserved, and failure to comply shooting quotas of game species. Laws often include sanctions and fines which might be enforced by threat of physical force. Additional sources of power are given by allies of a specific actor. It provides the actor, for instance structural power by the formal network written in a law. Therefore, if an actor could implement additional competences of state actors with the right to control and apply sanctions, allies might expand the power of such an actor (Krott et al., 2014, p.38).

Coercion is exerted by applying force or threatening force and depends on the existing resources of an actor. In democracies it is clearly defined who is allowed to make use of coercion and in which manner. When coercion occurs it usually is a result of the existing legislative regulation scheme and, important to mention, sometimes an unnoticed infringement of laws. We use the term `feature` for any type of applied and empirically proven coercive power in GreenRisk4Alps. Features are the observable facts that allow us to evaluate actors power. The following table (2) provides an overview of occurring features in the different PAR´s.

Feature	***Example***
Executive / legislative rights of decisions	By parliaments
Ability to set regulations	By authorities
Property rights	By forest owner / farmer
Rights of use	Forest pasture, tenancy of a hunt
Guarantee of free access to nature	By the Austrian forest act
Close roads / areas	By the Austrian traffic regulation
Concessions of use	Using non owned trails for livestock to achieve mountain pasture
Resources to control regulations	staff, company cars, equipped with weapons, …
Resources of implementing grey measures	staff, construction machines, …
Enforce regulations by physical means	By police
Prohibition of access	Fencing, close the road by police
Implement protected forests	Downstream land owners
Ability to implement grey measures on non-owned property	State agencies of protection

Table 2: Examples of features for coercion

3.1.2. Incentives

(Dis-)incentives are used to change the subordinates' behaviour by providing them with advantages or disadvantages until they will follow the goals of the potentate. The desired behaviour will be achieved by penalties, e.g. for clear cuts above a specific extent in protective forests on the one hand and on the other hand, by advantages, where the potentate has the willingness to pay a price for a specific behaviour of the subordinate. Whereas the first mechanism often links to coercive power, forced by the state and legitimated by law or binding guidelines so that the subordinate will accept the disadvantage, the second mechanism operates on more of a voluntary level. Penalties will have an impact on the subordinate only if there is a coercive authority that is able to force him to pay.

Therefore, the amount of the penalty is a disincentive (Krott et al., 2014, pp. 38-39). The second mechanism is given, for instance, through subsidies for specific measures in protective forests, e.g. afforestation, stand treatment by cable car, debarking of trunks (Bavarian State Ministry for Food, Agriculture and Forestry, 2018) and depends on the potentate's financial resources and on the subordinates' marginal utility. (Dis)-incentives unfold impact even through immaterial sources. They vary from social or psychological advantages, like advantages grounded in moral demands or triggered by erotic impulses (Olson, 1971, p.61), whereas morality entails a certain behaviour wishful with regards to societal expectations and social conventions. The table (3) below presents important examples of existing features for (dis-)incentives in the PAR´s.

Feature	***Example***
Amount of fines	§ 66 Tyrolean forest order
Subsidies to maintain, use or improve certain ES	Austrian forestry funding catalog; area payments for farmers
Budget for subsidies	Annual budget for measures of the Austrian forestry technology services for torrent and avalanche control
Budget of the authority	Total budget of the Tyrolean Forestry Directorate
Consultation of forest owner	Forest inspection of the district
Provide income and revenue possibilities by using ES	Timber supply of the regional economy; paying for the tenure of land for certain activities (e.g. hunting, running a ski resort / cable car, …)
Appealing to moral / social conventions (values, norms, virtues)	Hunting values; farming values; paradigm of risk transfer systems; animal welfare

Table 3: Examples of features for (dis-)incentives

3.1.3. Dominant information

Dominant information occurs if the subordinate makes a decision based on information, delivered from the potentate, that he does not verify. This mechanism operates in both directions by suppling true information and by supplying erroneous information in the same extend. It could be the free will of the subordinate that he is not checking the information. Therefore, it is a voluntary decision of the actor. Ideologies might cause this effect in the confidence that the potentate disseminate true information. The subordinate does also not check the information when he has a lack of direct relevant information or his resources to close the lack is not sufficient. In complex issues, the decision processes require the excellent professional knowledge of experts. Here, the subordinate is often overstrained in his own knowledge resources and will not be able to check the information of the participating experts. This compulsory process does occur much more than the voluntary process and indicates clearly how strongly independent information is provided by experts or even researchers (Krott et al., 2014, pp. 39-40).

In risk management for natural hazards we have multiple applications of dominant information. Experts knowledge is provided for instance, through avalanche bulletins, danger zone mapping, forest management plans and the construction of avalanche dams or retention basins. "Normal" actors do not have the knowledge or resources to check the backgrounds and facts of the provided information. They rely on the reliability of the information. A significant example of dominant information is the aimed reduction of game densities, pursued by specific actors like the state agencies for forests, in some PAR´s. Despite game species being countable and usually well known, hunters claim that the animals are not present in the hunting area during the hunting season because they move a lot. This argument is often used when the shooting quota was failed and may not be checked by others

(Interview 1V/G-4). On the one hand, hunting laws prevent this verification and on the other hand, slight resources in staff of authorities (e.g. department hunting authority of the district Innsbruck land) or insufficient knowledge about wildlife ecology are strong barriers to check the information of hunters. The following table 4 summarizes occurring features for dominant information.

Feature	***Example***
Binding information provided by state agencies	Avalanche and torrent control - danger zone mapping Avalanche commission Declaration of protection forests Declaration of nature conservation areas
Non-binding information provided by state agencies	Avalanche warning Consulting of forest owner by forest service
Information provided by NGO´s	Environmental actors - uniqueness of habitats Farmer associations – importance of alpine faming for biodiversity Alpine club – endangerment by over tourism in the alps
Information provided by experts	Forest management plans Game stock calculation / counting by hunters Provider of traffic infrastructure - amount of daily users of roads Tourism manager – number of overnight stays / visitors
Ideology	Technology faith Negation of global warming
Misinformation	About game densities Wood harvesting

Table 4: Examples of features for dominant information

3.2. Evaluation of actors´ power

The following table summarizes the actor-centred power approach and defines the power elements. Additionally, it explains the operating power mechanisms for each power element.

Power element	***Definition***	***Power mechanism***
Coercion	Altering behavior by force	• Applying force • Threating with force • Resources of force
(Dis-)incentives	Altering behavior by (dis-)advantage	• Applying material or immaterial (Dis-)incentives • Promising or threatening with (dis-)incentives • Resources of (dis-) incentives
Dominant information	Altering behavior of the subordinate by unverified information	• Applying dominant information • Ideology • Resources of dominant information

Table 5: Power elements of the Actor-centred power

For the evaluation of actors' power, we conducted the analysis of all ES with regards to potential influences on risk management in natural hazards. The empirical base for that is given by the interest

analysis and the selection of ES from D.T2.3.1. For each occurred feature of an actor we checked which power element was applied or threated and which influences it had. Therefore, the possible influence on the ES and thereby the power of an actor or acting group is visible. The evaluation of each power element depends on the following criteria:

1. On the size of an area of impact.
2. On the time aspect of impact.
3. The number of direct or indirect influenced ES that influence risk strategies.
4. The available and / or applied resources of an actor.

We estimated the power elements in a qualitative technique based on the following evaluation scheme:

Power	***Coercion/Incentives/Dominant information***
+++ Strong	Majority of the area/long time period/for various ES/by high resources
++ Medium	On sub-areas/medium time period/for several ES/by moderate resources
+ Low	On particular areas/short time period/for individual ES/by limited resources
0	No area/no ES/no resources

Table 6: Evaluation scheme for power elements

Through the Austrian PAR Vals / Gries, we will demonstrate for one actor how its power sources interact and lead to a specific evaluation of power. This displays the capability of the actor to influence other actors and to enforce his own interests. We make use of such interactions to push scientific solutions to practice. One important actor in the Austrian risk management of natural hazards is the Austrian technical service for torrent and avalanche control. Additional to its responsibilities of avalanches and torrents he provides information about rock fall and landslides. The responsibilities are perceived by three measure (i) technical protection measures; (ii) forest-biological measures; and (iii) regional planning by hazard zone mapping (Weiss, 1999, pp. 252-262). All tasks of the federal owned organisation are recorded in the Austrian forest Act (1975) and several guidelines (e.g. Austrian Ministry of Agriculture, Forestry, Environment and Water Management., 2006). Here, competences, structures and budget responsibilities are defined. For instance, in the State of Tyrol this organisation manages 11.510 km^2 of torrent and avalanche basins which is equivalent to 91 % of the whole area of the Tyrol. Therefore, this organisation might intervene on a major area (Austrian Ministry of Agriculture, Forestry, Environment and Water Management., 2020). The lifetime of interventions in the ecosystem by implemented measures range from decades, e.g. avalanche barriers made of wood, to centuries by forest-biological measures like planting *larix decidua* or *pinus cembra* as highly adapted protective forest species. Legal provisions also guarantee such long-term measures. If we consider the overall interaction of the possible measures to the ecosystem, this will effect various ES and touch other actors interests in it. Thereby, this organisation might apply high budgetary resources, e.g for the Tyrol 72.1 million Euros in 2018 (Austrian Ministry of Agriculture, Forestry, Environment and Water Management., 2018) for the protection against natural hazards which includes staff and technical equipment to perceive their task. This is on the one hand subject of budget negotiations between ministries and on the other hand, formulated in the state law that guarantees the cost coverage of the organisation. To sum up, the Austrian technical service of avalanche and torrent control has strong coercive power.

Power elements may not be considered independently from each other. Instead they Interact with other power elements and are mutually dependent or a requirement for another. Incentives such as

subsidies do not normally appear through a regulative act like forest funding and consulting programs initiated by the government for private or community forest (e.g. Bavarian State Ministry for Food, Agriculture and Forestry, 2018; Region of the Tyrol, 2019). For this purpose, the government provides the necessary budget and implements control mechanism as well as distributes regulations and staff with expert knowledge. The forest owner receives the provided information from experts as dominant information because they are often not able to check it without specific education in forestry. Simultaneously the expert knowledge has the same effect incentives have. Due to the fact that the described situation is voluntary for the forest owner we assume that only a sub-area and there several ES by moderate resource usage for selected measures will be affected. Consequently, we evaluated the power element incentives and dominant information as medium. As we might see in this example detailed information about legislative and administrative structures as well as the practical execution allow a reliable evaluation of actors' power.

The ensuing tables summarizes the evaluation of power sources of different actor categories in each PAR of the GreenRisk4Alps project. It is assigned to the three power sources coercion, (dis-)incentives and dominant information.

Evaluation of actors' power in the PAR´s

	Regulator											Power resource	Alternative risk strategies (%)	User							
Containment Blue lights	Risk Transfer		Media	Construction companies	Financing	State agencies of						Municipalities			Forest-Owner	Consumer in endangered zones	Producers in endangered zones	Consumer – traffic Infrastructure	Provider traffic Infrastructure	Environmental actors	Citizen	Alpine Grazing	Hunter
	Private	Public				Protection	Forests	Environment	Agriculture	Traffic, infrastructure spatial planning, regional development	Hunting												
++	0	++	0	0	+	+++	++	++	++	++	++	++	Coercion		++	+	++	+	++	0	+	++	++
+	+	++	0	+	++	++	++	+	+++	+	+	+	Incentives		+	+	++	+	++	0	+	++	+
+++	+	++	+++	++	+	++	++	++	++	+	+	+	Dominant information		++	+	+	+	+	++	0	++	++

Table 7: Evaluation of actors power in the PAR Brenner Region (Austria)

	Regulator											Power resource	Alternative risk strategies (%)								
Containment Blue lights	Risk Transfer		Media	Construction companies	Financing	State agencies of						Municipalities			Forest-Owner	Consumer in endangered zones	Producers in endangered zones	Consumer – traffic Infrastructure	Provider traffic Infrastructure	Environmental actors	Citizen	Alpine Grazing	Hunter
	Private	Public				Protection	Forests	Environment	Agriculture	Traffic, infrastructure spatial planning, regional development	Hunting												
+	0	++	0	0	0	++	++	++	++	++	++	++	Coercion		++	+	++	+	+	0	0/+	++	++
+	+	++	0	+	++	++	++	+	+	+	+	++	Incentives		+	++	++	+	+	++	+	++	+++
++	+	++	++	++	+	+++	++	++	++	++	++	+	Dominant information		++	+	+	0	+	+++	0	++	++

Table 8:Evaluation of actors power in the PAR Parc des Baronnies (France)

Evaluation of actors' power in the PAR´s

	Regulator											Power resource	Alternative risk strategies (%)	User							
Containment Blue lights	Risk Transfer		Media	Construction companies	Financing	State agencies of						Municipalities			Forest-Owner	Consumer in endangered zones	Producers in endangered zones	Consumer – traffic Infrastructure	Provider traffic Infrastructure	Environmental actors	Citizen	Alpine Grazing	Hunter
	Private	Public				Protection	Forests	Environment	Agriculture	Traffic, infrastructure spatial planning, regional development	Hunting												
++	0	0	0	0	+	++	++	+	++	++	++	++	Coercion		+++	+	++	+	++	0	+	++	++
+	++	0	0	+	++	++	++	+	+++	+	+	+	Incentives		+	+	++	+	+	+	+	++	+
++	++	++	+++	++	+	++	++	++	++	+	+	+	Dominant information		++	+	+	+	+	++	0	++	++

Table 9: Evaluation of actors power in the PAR Southern Wipptal (Italy)

	Regulator											Power ressource	Alternative risk strategies (%)	User							
Containment Blue lights	Risk Transfer		Media	Construction companies	Financing	State agencies of						Municipalities			Forest-Owner	Consumer in endangered zones	Producers in endangered zones	Consumer – traffic Infrastructure	Provider traffic Infrastructure	Environmental actors	Citizen	Alpine Grazing	Hunter
	Private	Public				Protection	Forests	Environment	Agriculture	Traffic, infrastructure spatial planning, regional development	Hunting												
++	0	+	0	0	+	+++	++	++	++	++	++	++	Coercion		++	+	++	+	++	0	+	++	++
+	+	+	0	+	++	++	++	+	+++	+	+	+	Incentives		+	+	++	+	++	0	+	++	+
++	+	+	+++	++	+	++	++	++	++	+	+	+	Dominant information		++	+	+	+	+	++	0	++	++

Table 10: Evaluation of actors power in the PAR Oberammergau (Germany)

Evaluation of actors' power in the PAR´s

	Regulator												Power resource	Alternative risk strategies (%)	User							
Containment Blue lights	Risk Transfer		Media	Construction companies	Financing	State agencies of						Municipalities			Forest-Owner	Consumer in endangered zones	Producers in endangered zones	Consumer – traffic Infrastructure	Provider traffic Infrastructure	Environmental actors	Citizen	Alpine Grazing	Hunter
	Private	Public				Protection	Forests	Environment	Agriculture	Traffic, infrastructure spatial planning, regional development	Hunting												
++	0	+	0	0	+	+++	++	++	+	+	++	++	Coercion		++	+	++	+	++	0	++	+	++
+	+	+	0	+	++	++	++	+	++	+	+	+	Incentives		+	+	++	+	+	0	+	+	+
++	+	+	+++	++	+	++	++	++	+	+	+	+	Dominant information		++	+	+	+	+	++	0	+	++

Table 11: Evaluation of actors power in the PAR Val Ferret (Italy)

	Regulator												Power resource	Alternative risk strategies (%)	User							
Containment Blue lights	Risk Transfer		Media	Construction companies	Financing	State agencies of						Municipalities			Forest-Owner	Consumer in endangered zones	Producers in endangered zones	Consumer – traffic Infrastructure	Provider traffic Infrastructure	Environmental actors	Citizen	Alpine Grazing	Hunter
	Private	Public				Protection	Forests	Environment	Agriculture	Traffic, infrastructure spatial planning, regional development	Hunting												
++	0	++	0	0	+	++	+++	++/+	++	+	++	++	Coercion		+++	0	+	0	++	0	+	++	++
++	+	++	+	+	+	+	++	+	++	++	+	+	Incentives		+	++	++	+	++	+	+	+	+
++	+	+	++	++	+	+	+++	+	++	0	+	+	Dominant information		++	0	++	+	++	+	+	++	++

Table 12: Evaluation of actors power in the PAR Kranjska Gora (Slovenia)

4. Linking alternative risk strategies with actors

The integration phase of the RIU model tries to connect the scientific knowledge to actors needs and expectations in the practical sphere (Böcher and Krott, 2016, p.34). In order to achieve this, the RIU model names four subtasks that will enable a pluralistic foresighted integration from the scientific findings into practical actions (Böcher and Krott, 2016, p.24). For GreenRisks4Alps we have to check whether the subtasks will be fulfilled or if it is unlikely. For that, the interest analysis as well as the power source analysis are preconditions to accomplish the subtasks. We will draw conclusions of both analyses with regards to the subtasks and highlight how allies could be identified in the following four sub-chapters.

4.1. Orientation toward public goals

Applied research projects like GreenRisk4Alps aim to give answers to societal questions, firstly a general understanding of societies well-being and secondly, current political problems and practical demands (Böcher and Krott, 2016, p.34). The protection of human beings and their activities against possible consequences of natural hazards try to minimize risks for the whole society itself. For GreenRisk4Alps those are challenges like limiting settlement space, increasing costs for the protection of settlements or more conflicts due to rising demands and expectations on safety as well as the own self-development without limitations by natural hazards. From societies point of view this contribution of research projects to the social welfare is easy to communicate and a general agreement is feasible. Additionally, the European Union as funding organisation of GreenRisk4Alps defined the overarching public goals in their research programme Interreg Alpine space through priorities and objectives. Despite, competing or contradictory public goals formulated by society and its institutions, exist. Environmental protection, ensuring biodiversity, autarky in food production or economic prosperity might be examples of different public goals. If contradictions do exist in different public goals, a foresighted integration has to consider such circumstances and to clearly communicate how realistic the success of scientific information can be in the knowledge transfer process. The identified conflicts in chapter 2.2 even comprise competing or contradicting public goals. One outstanding example is the public goal of economic prosperity by tourism in the PAR´s (Interview 1V/G-10; 2O-3; 6-2). This is often hard to achieve when tourism itself increases the risk potential of natural hazards. It directly leads to current political and practical demands, for instance in Val Ferret where the Planpincieux glacier comprises the tourism economy in this important touristic valley and simultaneously endangers the tourists. Closing the valley may cause a conflict between different public goals and addresses questions directly to researchers about the risk potential of the situation in regular reports. Political actors as well as experts who have to realize the two different public goals seek solutions, especially in science and in tailored research results. In Val Ferret researchers had the ability to exactly observe the situation and forecast the potential risk of the glacier in time (Safe Mountain Foundation, 2019). Political actors trust this information and base their decisions on current scientific findings. There is no doubt that trust in scientific research is a result of independent research without meddling of political actors or private interests. Researchers have to be able to produce scientific knowledge against criticism and political opportunity (Böcher and Krott, 2016, p.43) and need the required resources. Despite the fact that political actors and private interests seek to influence the GreenRisk4Alps project in a soft manner, e.g. by the selection of the project area (Interview 2O/E-1), the projects orientation toward public goals is complies widely as explained before and is funded by the public. This allows independent and unbiased research.

4.2. Relevance in regard to political process

Politicians have to solve current practical problems and should be able to supply alternatives for different actors' interests. Negotiation and decisions are their day to day business in which prognoses help them to assess the future development of the problem. The actually mentioned Val Ferret Planpincieux glacier problem or the rock avalanche of the Valsertal in 2017 demonstrate the need for prognoses and science -based information. Although it needs to be timely and should provide additional time to react or make changes (Böcher and Krott, 2016, p.44), it also means to equally have scientific knowledge about possible problems in the future that might become reality. In GreenRisk4Alps the models and applications implement future developments, for instance climate change and forest changes is indirectly implemented by hazard changes and the following impact scenarios are established as well as considered in WP 1 and WP 3. The described points that establish relevance concerning the political process will be completed by researchers with practical experience, especially with administrations and politics. Here, the involvement of federal or state research institutions in the GreenRisk4Alps project might lead to a better understanding of the political process and the needed information type of political actors and the needed intermediation. Additionally, the political process itself is considered part of the activities of WP2 and WP 4 in GreenRisk4Alps and pursues directly and indirectly to produce relevance.

4.3. Relevance of alternative risk strategies in regard to interests of actors

Previous subtasks are often fulfilled in the beginning or even in the planning phase of a project and might be determined by the funding program, especially by public funded programs like Interreg Alpine space. In such programs, the orientation toward public goals is inherent. The researchers themselves are able to influence the research extent by providing alternatives and prognoses for politicians. A selection of research staff for a scientific project with additional practical experiences in the political process is an additional benefit for establishing practical relevance for actors. Integration searches for a direct connection between science–based solutions and concrete actors. The latter comprises different resources that describe a potential for an actor to be a possible ally. But actors will have the willingness to make use of their own potential only if the science-based solution is compatible with the interests of the actor (Böcher and Krott, 2016, p.45). This evaluation was carried out in the interest analysis of the deliverable D.T2.3.1. Here, supporters and opponents of science-based solutions are identifiable and we know which parts of them attract potential allies and how we should adapt to increase compatibility. Often, only parts of scientific-based solutions are interesting for actors. Such scientific bricks have to be identified and addressed to actors. To develop and implement win-win strategies might be the best way but it is hard to achieve and needs excellent background knowledge of practical and political needs as well as knowledge about the research results. Conflicts between actors, for instance in land use issues of forest owners and authorities in natural hazard risk management, often obstruct win-win solutions due to the different interests in ES and result in trade-offs.

RIU does make use of the potentials of actors to influence decisions and actions. It tries to find different allies to certain assigned and relevant power sources. This process is the most important one and provides the greatest possible influence for successful knowledge transfer. On the opposite, if this potential is not being considered systematically it creates insurmountable obstacles for science-based solutions. In chapter 3.2 of this report we examined and evaluated the power sources of actors. This does not necessarily mean that the most powerful actor is the best candidate to push a solution. Rather a correlation is needed between a certain strong interest and specific power sources to push a science-based solution, even against the resistance of other actors. The RIU-model incorporates actors with their characteristics and potentials for application of a specific solution into four different types of allies that an actor can play (Böcher and Krott, 2016, p.36). Firstly, we have the internal ally who is part

of the research project and uses the results for their own interests because it promises advantages. In GreenRisk4Alps this role might be perceived by the involved stakeholders for interviews, workshops and expert meetings as well as by certain observers of the project. Secondly, the internal ally is able to exert pressure from outside because of his own power sources. This ally does not directly participate in the research process but is being interested in the application of the research results. Typical representatives are authorities like ministries, which provide funds for forests and especially for protective forests. The third ones are learning allies. They change their behaviour due to a learning process as a consequence of the produced scientific research results. Own interests might now appear in a new light and are newly interpreted. It could lead to a change of their own position and to adapted behaviour. Results gained from the models for gravitational hazards in GreenRisk4Alps could arise such a change of consequence of new information. As a fourth type, wise allies might occur in the knowledge transfer process. They use scientific results only as one type of information. They make decisions based on other sources as well, like traditions, sector belief systems, everyday knowledge and practical experiences (Böcher and Krott, 2016, p.37). Science is indeed part of the decision-making process of this ally type but it plays only a limited role for a certain kind of decision in proportion to all available knowledge sources. For natural hazard risk management different land use actors like forest owner, mountain farmers and hunters base their decisions mainly on practical experiences and do not trust or follow research results immediately (Interview 1V-2; 1G-8; 1V/G-11).

4.4. Target-group oriented intermediation

Research results of the knowledge transfer process from previous projects (ALTERFOR Project Report, 2018) underpin the need for a targeted group-oriented intermediation of science-based information. To address actors requires the selection of specified media, communication channels and a targeted group-oriented language (Böcher and Krott, 2016, p.46). Scientific findings are often complicated and difficult to mediate as well as full of technical terms from different scientific disciplines, in particular in GreenRisk4Alps from forest science or geological science. This has to be adapted to the requirements of the recipient. The use of too academic a language has to be avoided and furthermore, the needed time to present research results has to be restricted. Only research results selected with regards to actors' interests ought to be presented. As a consequence of these requirements, only a small selected group of actors or a single actor come into question as a target group. For instance, a workshop for private forest owners has to be organized different in comparison to a workshop with forest experts from an authority. Not the efficiency of how many actors will be reached with the intermediation should be in focus of the efforts but rather the tailor-made target-group intermediation based on the described requirements.

5. Conclusion

From the point of view of knowledge transfer, from research to practice, the awareness and acceptance of actors in natural hazard risk management is strongly connected to their relevant interests. If interests become perceived by actors and these interests cannot be fulfilled simultaneously in the ecosystem, conflicts might arise. Conflicts will be regulated by information and power sources of involved actors. In the comprehension of RIU, this process leads to acceptance of measures and will happen with regards to actors' interests. RIU makes use of this process and links the science-based solutions to actors' interests and capabilities to regulate conflicts or to push the solutions. Here, the chance that parts of scientific findings might be transferred to practice is much higher, because of certain power sources of actors and certain interests that exist where science-based solution might contribute. For this, the evaluation of power is needed as well as the evaluation of interests of actors, because this knowledge for the foresighted integration increases the probability that conflicts might be regulated and selected science-based solutions to initiate the knowledge transfer. Besides the most efficient entry point of considering power and interests of actors as well as

to identify allies, RIU also focuses on three additional subtasks. These gave answers to the specific question how to link science-based knowledge to actors and its practical application. All four subtasks have to be fulfilled for the successful knowledge transfer process and will give practical guidelines to establish a precise knowledge transfer strategy. For this, it is necessary to combine the knowledge of natural science and social science to establish such a strategy for the integration process. Here, social science exchanges information about actors and their interests as well as their power sources with colleagues who establish the models and applications and its results. The influence on interests of actors has to be determined in this process. Then opponents and supporters of science-based solutions can be considered in the strategy, which attempts to establish allies. This exchange process of different scientific disciplines is dependent on each other because it has direct and indirect results to the strategy itself and has to be seen in a dynamic way. Afterwards, we know which actor with which science-based solution and with which target-group oriented communication might be addressed. The developed integration strategy, checked on the subtasks, has to be extended to the selection of the most promising and most efficient integration process. Here, we mean the hypothetical or real location where practitioners and researchers' will meet. It describes the format of exchange of science-based solutions. This includes the institutional setting from chapter 1.2 in D.T2.3.1 where actors are embedded. We purse here, because of the integration strategy, to address the selected actor and to encounter him in the real world. This is formed by the institutional setting and we try to identify the most efficient way, so that the institutional setting enforces its interests and not hinder the knowledge transfer process. Thus, research results become part of the decision making process through the choice of the most appropriate integration process.

The theoretical backgrounds becomes established in the deliverable D.T4.1 and should be applied in two selected test PAR´s of the GreenRisk4Alps project and if necessary, they will be improved in D.T.4.2.1. for further application in other PAR´s.

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