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Guidelines for the choice and evaluation of mechanisms to boost the production of public goods by agriculture and forestry

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Contents

List of abbreviations

AES: Agri-environmental schemes

AFS: Agriculture and forest systems

AT: Austria

BAU: Business as usual

BG: Bulgaria

CZ: Czech Republic

CAP: Common agricultural policy

COP: United Nations Climate Change Conference

CSR: Case Study region

DE: Germany

EC: European Commission

EE: Estonia

EU: European Union

ELUS: Extensive land use system

ES: Spain

FCM: Fuzzy cognitive mapping

FI: Finland

FOR: Forestry

EU: European Union

FR: France

ILUS: Intensive land use system

IT: Italy

LAG: Local action group

LRVT: Landscape and Recreational Values Trading

MD: Market driven development

NL: Netherlands

PB: Public bad

PES: Payment for ecosystem services

PG: Public good

PGB: Public goods and bads

PL: Poland

RALUS: Risk of abandonment of land use system

RDP: Rural development program

RO: Romania

SD: Sustainable development

UK: United Kingdom

WP: Work Package

WTP: Willingness to pay

WTA: Willingness to accept

Introduction

This document represents deliverable D5.4, the last one within Workpackage WP5 "*Formulating and evaluating governance mechanisms for delivery of public goods*" of the EU Horizon 2020 project PROVIDE (PROVIding smart DElivery of public goods by EU agriculture and forestry). The single objectives of WP5 were to identify private and public governance mechanisms for the smart delivery of Public goods (PG)/avoidance of Public bads (PB), to design evaluation approaches to integrated and innovative governance strategies, to comparatively evaluate the potential success or trade-offs of the most promising governance strategies at case study level, to analyse the practicability and transferability of these governance strategies at programming and EU level, and to formulate guidelines for the choice and evaluation of governance instruments for PG delivery.

While deliverable D5.1, D5.2 and D5.3 reported on the achievements in respect to the first 4 objectives, deliverable D5.4 "*Guidelines for the choice and evaluation of mechanisms to boost the production of public goods by agriculture and forestry"* reports on the achievements in respect to the last objective of the WP. It synthesizes the findings of Task 5.5 "*Lessons learned and implementation guidelines*", which brings together overall results and conclusions with the aim of giving practical guidance based on the approach followed in PROVIDE.

Deliverable 5.4 starts with describing the process of a participatory development of improved governance mechanisms for public good provision (Chapter 1). In detail, Chapter 1 guides through the technical process of participatory mechanism design (Chapter 1.1), continues with the lessons learned from the most important results of participatory mechanisms development (Chapter 1.2) and closes with the advantages and challenges of the approach (Chapter 1.3). In Chapter 1.2, the PROVIDE insights are moreover put into the context of current developments of agri-environmental policies.

Chapter 2 describes the approach to evaluate the mechanisms effectiveness in improving public good provision in the single PROVIDE case study regions (CSRs). Again, the first subchapter (Chapter 2.1) guides through the most important single steps necessary to evaluate the mechanisms. Chapter 2.2. then describes the main lessons learned from the evaluation of mechanisms from the methodological point of view as well as from the results gathered from evaluation. Chapter 3 concludes with an overview on the PROVIDE

mechanisms. In order to enable a direct and fast comparison of mechanisms, the single mechanisms are presented in form of facts sheets, containing information about evaluation methods, strengths, weaknesses, barriers and enabling factors for uptake, transferability, as well as policy recommendations.

As Deliverable 5.4 brings together the results and the conclusions from the work carried out in the PROVIDE WP5, it particularly draws from Deliverables D5.1, D5.2 and D5.3. (Roberts et al., 2018b; Schaller et al., 2017; Schaller et al., 2018). Moreover, particularly the parts about participatory co-design are closely related to work carried out in WP2, therefore they particularly draw information from Deliverable D2.4 (Roberts et al., 2018a). Crucial for the development of mechanisms was moreover the valuation of public good demand and supply in the PROVIDE WP4. Here, D5.4 draws inputs particularly from Deliverables D4.2 and D4.4 (Villanueva et al., 2018; Villanueva et al., 2017).

Internal review:

To ensure the quality and correctness of this deliverable, we implied an internal review and validation process. The deliverable was drafted by the workpackage leader (BOKU). The co-leaders of task 5.5 (UCO and JHI) reviewed the overall draft and moreover reviewed and validated the parts of 5.4 dealing with WP4 (UCO), WP2 (JHI) and WP5 task 5.3 (JHI). Furthermore, the draft of the deliverable was sent out to all partners to particularly validate case study specific information. Finally, the draft version was submitted to the project coordinator, for a final review and validation.

1 PARTICIPATORY DEVELOPMENT OF IMPROVED GOVERNANCE MECHANISMS FOR PUBLIC GOOD PROVISION

1.1 GUIDING THROUGH THE PROCESS OF PARTICIPATORY CO-DESIGN OF MECHANISMS

The approach of developing and evaluating mechanism for improved provision of public goods from agriculture and forestry in PROVIDE was distinctively participatory. In the project, a structured and step-wise process of stakeholder involvement was carried out, in which participatory elements and scientific processing of inputs/expertise gathered through stakeholder participation alternate (see Figure 1).

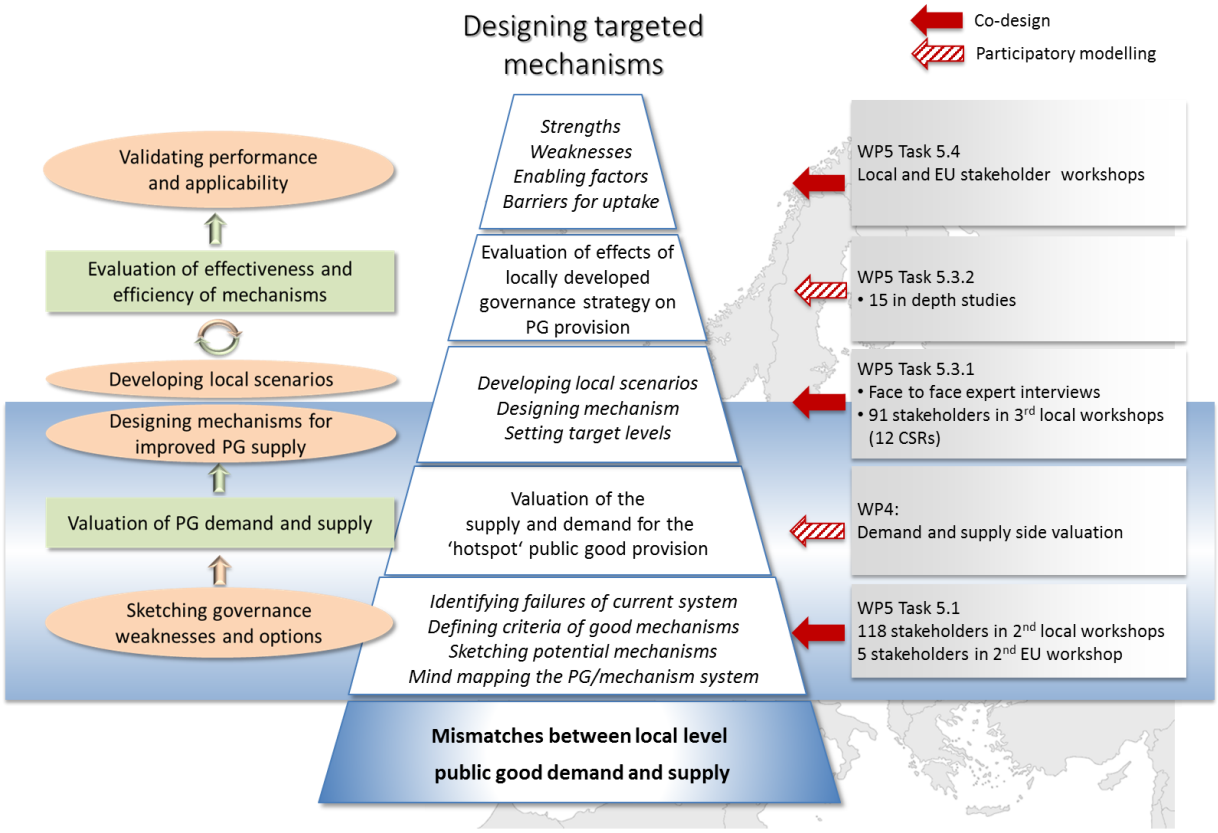

Figure 1: The PROVIDE approach of the participatory design of mechanisms

Having learned from the experiences of PROVIDE, in order to guarantee a comparable participatory elaboration of governance mechanisms across strongly differing case study regions with strongly different public good issues, in the following we present a model of interaction with stakeholder as a part of an evidence based policy process.

Based on a profound definition and mapping of mismatches between local/regional level demand and supply of PGBs (WP3 in PROVIDE), the process of participatory ***co-design of mechanisms*** should be implemented in 2 steps of stakeholder/expert involvement, with the following objectives:

- Objective 1: Sketching weaknesses and options in the current governance system
- Objective 2: Designing mechanisms for improved PG supply, overcoming weaknesses and integrating criteria of "good" governance

In PROVIDE, the second objective of the participatory development of mechanisms was fed by the results of a public good valuation exercise (WP4 in PROVIDE) (Villanueva et al., 2018), giving important insights about societal demand for PG provision, as well as the costs of improved PGB supply.

1.1.1 Objective 1: Sketching weaknesses of current governance system and governance options for improvement

At the beginning of the process of mechanisms co-design, the intention should be to learn, which governance related deficiencies lead to mismatches between demand and supply of public goods on local level and how mechanisms need to be improved so deficiencies can be overcome.

The expected outcomes of this step of the co-design process should be i) insights into the most important failures and mismatches of the current governance systems, ii) a development of criteria for good governance mechanisms, iv) an overview on the system of relationships determining the local PGB issues (including the relevant PGBs at stake, the local actors, as well as the factors affecting agriculture/forestry and the production of PGBs), v) a general overview of potential governance mechanisms, including advantages, disadvantages and potential beneficiaries and vi) a selection of governance mechanisms to be empirically analysed in the CSRs.

Operationalisation: The example of PROVIDE

In PROVIDE, in order to sketch weaknesses of the current governance systems and governance options for improvement, information was drawn from the 2nd local workshops, which were held in all PROVIDE CSRs in line with WP2, task 2.2, involving 118 stakeholders in 13 countries in June 2016. To ensure that all societal relations within the CSRs were represented at the

workshops, importance has been attached to involving stakeholders from a wide spectrum, including e.g. representatives of the agriculture and forestry sector, government, public sector agencies (responsible for agriculture, forestry, environmental issues, planning, cultural/historic issues, recreation, etc.), NGOs and interest organisations (dealing with e.g. environment, outdoor recreation, tourism, culture/history, etc.), further experts (e.g. academics), local key actors and opinion leaders (e.g. leading farmers) (Roberts et al., 2018a).

To reach outputs **i)** and **ii)**, the failures of the current governance systems, as well as the criteria for good governance have been identified in common round table discussions at the workshops, and reported as discussion minutes in reporting templates to the WP leader. As regards output **iii)**, the identification of the system between actors, mechanisms and PG provision was based on conceptual map/systems diagrams, which have been prepared by the researchers' teams, representing a visual illustration of the main public good issue(s) in the region. Based on this draft visualisations, at the workshops the stakeholders commonly elaborated relationships and factors representing and driving the system. As regards **iv)** and **v),** based on a pre-defined list of potential governance mechanisms from literature (Schaller et al., 2017), for each PGB in the need of intervention, existing or novel governance mechanisms, which appeared suited to ensure a good/desired delivery of the PGBs, were commonly discussed. Furthermore, based on the system maps/diagram, for the most relevant mechanisms perceived suitable to solve the local PGB issues, particularly the following questions were answered: Where in the system would these governance mechanisms intervene/what levers are pulled at which relationships in the system? How would these mechanisms affect the rest of the system? What would be the advantages, what would be the disadvantages of the governance mechanisms? Which governance mechanism would work better to achieve a 'good' provision of each of the identified PGBs? Who would benefit and who would be negatively impacted from the implementation of such mechanisms? To what extent can the governance mechanisms deal with heterogeneity in the supply of PGBs? (Roberts et al., 2018a). The final system maps, including the summarised results of the discussions were reported to the WP leader in reporting templates (Roberts et al., 2018a) and used as the basis for setting provisional mechanisms and the related targets for local public good provision in the WP4 exercise (Villanueva et al., 2017).

1.1.2 Objective 2: Optimising/designing mechanisms for improved PG provision

The second objective of the process of mechanisms co-design should be the specification of particularly promising governance mechanisms, embedded into good and practical, real-world governance strategies, suitable to reach defined public good targets in the CSRs. The expected outcomes of this second step of the co-design process should be i) defined target levels for public good provision on local level, in the optimal case also including the scale represented by these levels (e.g. emissions mitigated per hectare/ per region/ per inhabitant/ etc.), and ii) defined governance mechanisms or mixes of mechanisms, optimized to solve the local public good issue and reach the defined target levels.

Operationalisation: The example of PROVIDE

In PROVIDE, the design of the mechanisms was part of the activities of the 3rd local stakeholder workshops, which were held in line with WP2, Task 2.2, involving 91 stakeholders in 12 countries. As the focus of these workshops was particularly on governance development, importance was attached to including stakeholders from the level of decision and policy making, the agriculture, forestry, trade/value chain, as well as the conservation sectors. To ensure continuity and engagement along the project, it was moreover recommended to include the stakeholders having participated in the precedent workshops as well.

Output **i)**, the definition of target levels of public good provision, was based on the presentation of the WP4 valuation results carried out earlier in the workshops (Villanueva et al., 2017). For defining target levels of public good provision, the levels used in the WP4 valuation exercise have been re-discussed with the stakeholders. Focus of the discussion was on the question which level of public good provision (of the specific CSR PGs) is appropriate and realistic to best meet all societal demands evident from the WP4 exercise in the CSR, whilst taking also into consideration the costs (e.g. for the farmers) for public good provision in the CSR. The activity was carried out in the form of open discussions to facilitate the gathering of relevant information with regards to the target levels.

As regards **ii)**, the design of specific governance mechanisms took into account the suggestions of mechanisms from the precedent workshops, 6 predefined criteria of good governance mechanisms, as well as the earlier defined target levels. The activity was carried out in form of group exercises at the workshops: Based on the results of the precedent 2nd workshops, before the 3rd workshops the researcher teams prepared handouts, tablecloths, flipcharts or

any other suited media, in which they picked up and described again the most relevant "Public goods/governance mechanisms pairs" that had already been identified. Making use of these descriptions, the stakeholders/experts re-discussed the suggested GMs against the background of the results of the WP4 valuation exercise and the target levels defined. In this process particular focus was on considering the criteria of good governance, and discussing how governance mechanisms needed to be designed to meet these criteria (and finally the target levels of public good provision). The stakeholders recorded their discussion results directly on the media provided for the exercise. The developed target levels and governance mechanisms provided the basis for the PROVIDE evaluation of mechanisms, where the performance of the strategies as regards public good provision was investigated.

1.2 LESSONS LEARNED FROM PARTICIPATORY PROCESS OF MECHANISMS DESIGN

1.2.1 Learning from the results

Agriculture and forestry systems (AFS) occupy 84% of the European land area and therefore have a powerful influence on the state of the European rural environment and the public goods (PG) provided in this environment. At this point in time, unfortunately, many agricultural and forestry areas in Europe still experience declines in PG provision, such as water quality degradation, losses of biodiversity associated with agro-ecosystems and grasslands, losses of soil functionality, or losses of rural vitality and other cultural services connected to agricultural and forestry activities. Also the participatory public good mapping in the 13 PROVIDE agricultural and forestry case study regions (CSRs) (D2.3 and D3.2), revealed a broad variety of unsolved local PG issues, showing that the provision of public goods from agriculture and forestry often doesn't match the society's demand for these goods (Marconi et al., 2016; Novo, 2017). In the PROVIDE CSRs, PGB issues mainly concerned biodiversity and habitat functions, water related issues such as water quality and quantity, soil related issues such as carbon sequestration, soil erosion or soil fertility, as well as issues concerning scenery and recreation and rural vitality (Schaller et al., 2018).

The described mismatches between public good provision and demand in European agricultural and forestry areas, and, in the worst case, also the further declines in PG provision, take place despite the enactment and implementation of a variety of European policies aiming at environmental friendly agricultural and forestry land use and PG provision (such as the Birds and Habitats Directives and the Water Framework Directive), and the green architecture of

the Common Agricultural Policy (CAP), which, up to now, primarily relied on the complementary implementation of the three policy instruments cross compliance, green direct payments and voluntary agri-environmental and climate measures. Largely based on the public-private dualism, these mostly top-down and farm-based forms of public intervention have been usually recommended to deal with the missing market for public goods and the related market failure in the form of their private under-provision, in order to guarantee the optimal provision of these goods.

In the first step of the PROVIDE participatory process of co-design of mechanisms, the major local-level shortcomings of the current policy approaches have been discussed. From 47 individual statements, 8 groups of governance failures were elicited (Schaller et al., 2017):

1. Lack of governance system thinking, leading to inadequate integration of stakeholders in the design process and to shortcomings in the coordination of measures.
2. Lack of "consequence", resulting from weak and undefined standards and restrictions and the lax enforcement of obligations and compliance with environmental thresholds
3. High complexity of mechanisms and measures, preventing the understanding of measures and objectives by the addressees and therefore causing low acceptance
4. Missing or wrong targeting, leading to ineffectiveness or even the pursuing of opposed targets
5. Lack of budget, leading to inadequate compensation
6. Missing connections to the markets/insufficient consideration of market solutions and win-win scenarios, while the dependency and constraints of the agricultural and forestry sectors on the global market and foods system is constantly rising
7. Missing trust, leading to low acceptance due to the felt risk of future determination
8. Missing information/awareness about public goods from agriculture and forestry

The stakeholders' experiences on basic failures and weaknesses of the governance systems and mechanisms in place made clear that improvements of the current governance framework, more targeted or simply better governance mechanisms are needed in order to overcome the deficiencies in public good provision on level of European agricultural and forestry areas. Indeed, the growing concerns about the ongoing and in some aspects worsening environmental impacts of agriculture, and the signing up of the European Union (EU) to new international commitments, such as the Paris climate agreement at the 2015

United Nations Climate Change Conference (COP 21), have already stimulated the awareness towards the development of more innovative and efficient governance options to be included into, or to complement, the current agri-environmental policies. In the case of the CAP, the Commission's communication on "The future of food and farming" already specified that higher ambitions and a stronger focus will be on result-based approaches as regards resource efficiency, environmental care and climate action (EC, 2017) and a number of the proposed CAP specific objectives in the respective proposal for a regulation 2018/0216 (COD) trigger environmental and climate action in line with the respective EU policies (EC, 2018). In general, the related operations in the "new CAP" are planned to be integrated into a more targeted, but also more flexible approach, addressing more responsibility to the Member States in devising mandatory and voluntary measures in Pillar I and Pillar II, to meet environmental and climate objectives defined at EU level. Also, it is envisaged that Member States are responsible to define quantified targets which will ensure that the agreed environmental and climate objectives defined at EU level are achieved (EC, 2017).

It can be anticipated that the stronger flexibility of the Member States will lead to more flexibility, but also more planning efforts in the development and design of more efficient and suitable instruments for addressing environmental needs and public good provision at local level, but also of suitable indicators for measuring their success. Concerning suitable instruments, several governance and mechanisms options for improving the delivery of PGs could be taken into account, going beyond the current forms of mainly public intervention: A broad range of governance options for public good provision available from literature has already been elaborated in WP5 Task 5.1 and described in the PROVIDE deliverable D5.1 (Schaller et al., 2017). The literature review illustrates that beyond the "classic" public regulation and binding standards, and the area payments in line with the CAP agrienviron-mental schemes, a broad variety of other financial mechanisms, such as public, outcome/ performance level based payments, public, area-based collective payments like agglomeration bonus or collective bonus, but also private incentives like payments for ecosystem services (PES) or result based premiums by the food chain, a variety of mechanisms on the basis of collaboration and partnerships, such as collective actions or collaborative partnerships, market instruments such as labelling, standards, certification, or instruments of advisory, information and awareness-building could be worth considering for future policy design (Schaller et al., 2017). This estimation is supported by the experiences from the PROVIDE 2nd

local stakeholder workshops: Commonly discussing, which of the alternative options of public good governance described in literature could be useful for solving the local public good issues in the context of their CSRs, and pushing forward own suggestions of mechanisms, it became clear that on the level of the European regions represented by our CSRs a broad range of ideas exist on how to improve existing mechanisms, develop new solutions or how to design orchestrated mixes of mechanisms in order to better provide public goods in the local contexts (Schaller et al., 2017). Moreover, in the PROVIDE workshops it became clear that the local and European level experts and stakeholders have a clear understanding on what makes governance strategies "good" ones, and which criteria need to be considered and fulfilled, to reach sustainable solutions. Eliciting and analysing 70 experts' statements from the 2nd local and the European workshop in July 2016, and matching them with criteria of good governance from the literature, in this respect PROVIDE succeeded in the development of a broad set of criteria of good governance, including 5 major groups considering criteria of 1) *good governance frameworks*, 2) *good governance design*, 3) *characteristics of good governance instruments*, 4) *monitoring* and 5) *mechanisms' performance* (Schaller et al., 2017).

Table 1: Provide set of evaluation criteria

Type of criteria	Criteria	
Governance framework	Functioning institutions Accountability Transparency Rule of law	
Governance Mechanism design	Inclusiveness/Participation/Communicative action Legitimacy/Consensus orientation Procedural and distributive justice, Fairness/Equity Objective, Science-based Clarity/Transparency of the design process Timeliness and facilitation efforts	
Governance Mechanisms Characteristics	Consistency of goals, Coherence Objective, Science-based Targeted to the topic Spatially targeted Targeted to the group responsible Simplicity/Practicability Adequate compensation of expenses Ancillary costs	Ancillary benefits Flexibility Partnerships between players Equity and fairness (GM-related) Vertical integration Horizontal integration Trust between admin bodies and farmers Trust between actors horizontally (land manager to land manager)
Monitoring	Measurability Reliable/fair measuring/monitoring institution (citizen science) Coherence of monitoring	
Performance	Acceptance Effectiveness Efficiency	

Besides the elaboration of criteria for better governance and the sketching of ideas on improved mechanisms, the 2nd stakeholder workshops also showed that the local experts' and stakeholders' knowledge and the problem awareness of the relationships characterising the system between mechanisms and local public good provision, the intervention of the potential mechanisms in the system and the way in which they would affect the rest of the system, as well as the additional drivers and influencing factors for effective and successful mechanisms' implementation is remarkable. Impressively this was sketched in the participatory process of mind-mapping in the 2nd local stakeholder workshops (see Figure 2 and Figure 3).

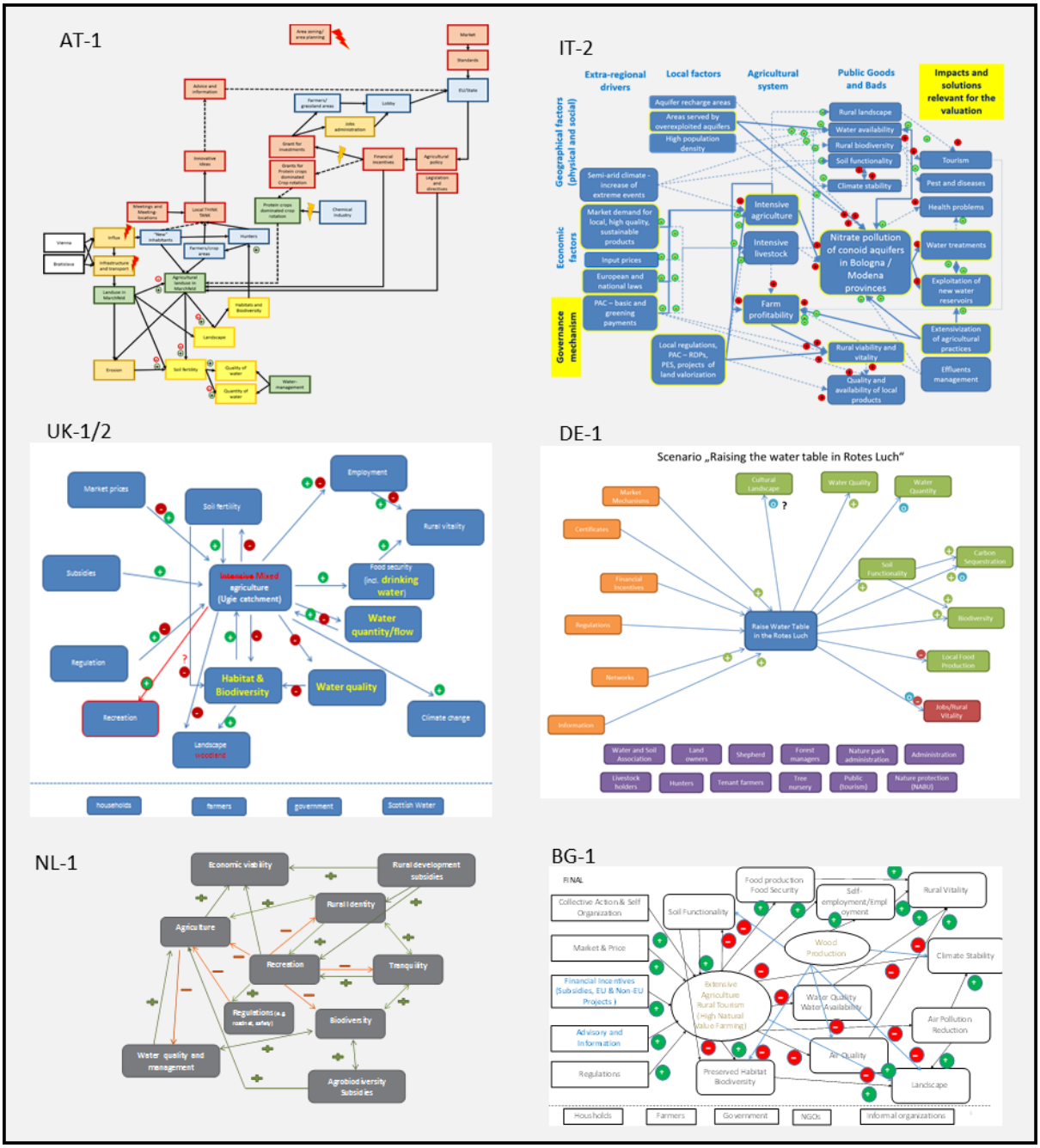

Figure 2: Mind-maps of public good issues and mechanisms in the PROVIDE CSRs AT-1, IT-2, UK-1/2, DE-1, NL-1, BG-1

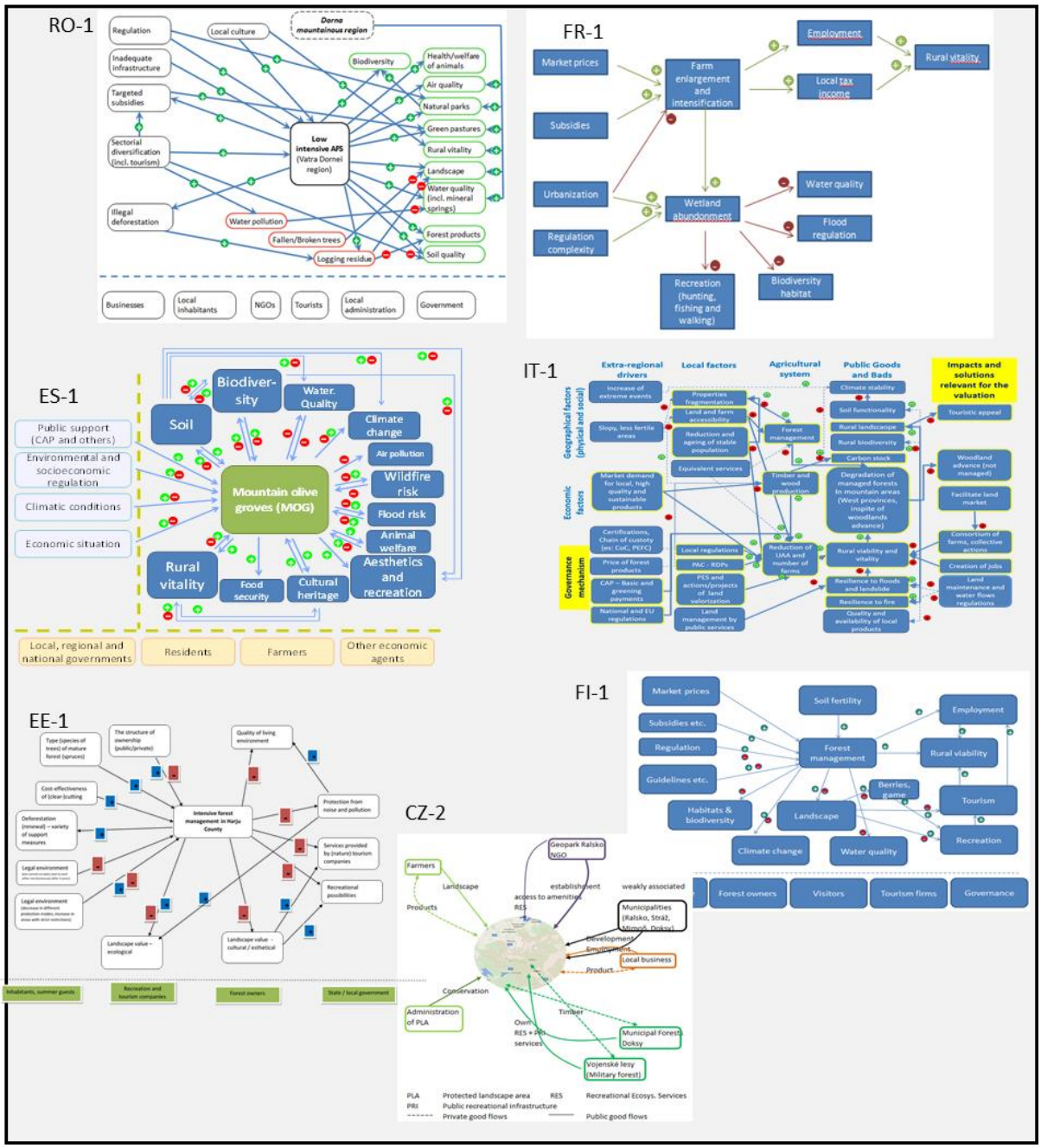

Figure 3: Mind-maps of public good issues and mechanisms in the PROVIDE CSRs RO-1, FR-1, ES-1, IT-1, EE-1, FI-1, CZ-2

The mind-mapping process was a pivotal step in the development of the final governance strategies on local level: not only did it help to better sketch the local systems and the relationships between mechanisms, actors, external drivers and public good provision, it also shed light on the advantages and disadvantages of the mechanisms and the question, who would benefit from the mechanisms and who would be negatively impacted from their implementation. The technique also strengthened the stakeholders' active participation in the workshops itself. The visualization of relationships sharpened the awareness towards the

provision of public goods and bads in the local contexts, not only on the experts' side, but also on side of the researchers. In some case studies, the results of the mind mapping could be directly used for the development of participatory modelling approaches for the evaluation of the mechanisms' effectiveness later in the project (e.g. UK-1, AT-1).

Beyond developing a clear picture of the public good issues, the pathways of PG provision and the factors influencing the effectiveness of potentially suitable mechanisms from the co-design process, a crucial input for the final determination of strategies and mechanisms was the public good valuation carried out in PROVIDE WP4 (Villanueva et al., 2018; Villanueva et al., 2017). The results of the WP4 valuation exercises in many CSRs delivered the required information on the local society's willingness to pay (WTP) for public good provision on the one hand, and the costs for this provision on the other. The results represented the basis for the determination of realistic and aspired levels of public good provision, particularly as the target levels used in the WP4 valuation were re-discussed and adapted (Schaller et al., 2018). From the stakeholder discussions about the WP4 valuation results it was learned, that the relatively high willingness to pay expressed in most of the PROVIDE CSRs came as surprise to some of the stakeholders. The results of the PG valuation gave insights into the local society's demand for public provision, in parts shifting target levels into the direction of higher provision. In contrast, in some regions stakeholders were astonished about the low willingness to pay (WTP) for PG provision. In IT-1 for example, the stakeholders expressed surprise over the relative low value for erosion with respect to carbon sequestration and apparently the disinterest of Emilia-Romagna citizens on rural vitality. Also as regards the costs of public good provision and the related payment levels required for farmers to be willing to accept agri-environmental measures, these results were unexpected to some stakeholders and gave important inputs for the discussion on how realistic target levels can be reached. For example in the case of AT-1, the farm level-costs for implementing the measures are clearly higher than the WTP in the region, for improving the PGs related to this management changes. Throughout many CSRs, it was considered to be important that the valuation exercises were carried out at local scale rather than on a regional or national level, as public good provision, but also the societal benefits from public goods were perceived to be 'local' for many public good issues and the values to be integrated in the target setting of the mechanisms therefore local-specific as well. In many CSRs the discussions revealed that the valuation results are perceived as of great importance for the design of locally tailored measures and mechanisms, however values

and therefore also the target levels for PG provision are estimated difficult to be transferred between issues and regions (Roberts et al., 2018a).

The process of the co-development of target-levels for public good provision revealed uncertainties and indicates that the target setting for policies and mechanisms needs steering by scientists and experts to overcome questions on who should be the persons in charge to decide, on which scale of provision levels should be fixed (spatial, temporal) and on how trade-offs between different public good targets can be dealt with. The experiences from the workshops showed, that different stakeholders have of course different opinions and also agendas on targets, so a fair balance of interests and a science-based agreement on PG targets was demanded by the stakeholders, for which the use of expert knowledge seems inevitable. In this respect it was only consistent that the predefined, literature-based target levels from the valuation exercises were mainly followed and accepted by the stakeholders. However, it seems that a tendency exists to vote for rather higher levels of public good provision. Also the development of indicators of monitoring and measuring public good targets emerged as a difficulty for stakeholders in most cases. Only in few CSRs desired levels of PG provision, as well as the related biophysical indicators, have been suggested as targets (such as numbers of bird species, amount of CO_2 accumulated, etc.). In contrast, often the desired level of implementation of measures can be formulated by the stakeholders (e.g. amount of area covered by conservation agriculture management (AT-1), or forest area under agreements preventing clear-cutting as target level for the PG of scenery and recreation (FI-1, EE-1)).

Looking at the governance mechanism that have been finally developed in Task 5.3.1 of PROVIDE's WP5, it becomes obvious that 3 main approaches have been followed to reach optimised solutions on mechanisms for public good provision: 1.) optimising *financial incentives*, 2.) optimising and orchestrating a combination of different mechanisms in *mechanisms mixes* and 3.) optimising the collaboration and funding opportunities in *collective actions* (Schaller et al., 2018).

Particularly when looking at the role assigned to financial incentives, it is striking that they are part of nearly all governance strategies and also mostly take the form of public payments in the framework of the CAP's Pillar II (Table 2). This result makes clear, that public payments have a prominent role in guaranteeing the provision of public goods and the avoidance of public bads. However, in most cases the suggested financial incentives differ from the current

solutions of public agri-environmental payments and aim at improved targeting (ES-1, EE-1), improved compensation (BG-1), improved implementation level or in their operationalisation as regards payment schemes, like collective bonus or agglomeration bonus (AT-1, IT-2, IT-3).

The choice of mechanisms also reveals, that in the case of the improvement of single public goods, mostly financial, stand-alone mechanisms appear to be best suited, while bundles of public goods are suggested to be improved best by bundles of mechanisms, going beyond financial subsidies and commonly including collaborative or collective approaches, education/information, market instruments or measures for awareness-building. Especially from the approaches developed in intensive regions it becomes clear, that financial incentives are not assumed to be enough if they come in the form of stand-alone mechanisms, but obviously need the add-on of participatory, collaborative elements as well as incentives/actions set by the value-chain to enhance acceptability. As regards collaborative/collective mechanisms, these turn out to be particularly suited for the improvement of public goods whose provision depends on the regional landscape rather than on the management of single fields or farms, and therefore require the coordination of efforts among the individual decision makers (e.g. water availability in CZ-1, pollination in IT-3).

Particularly in regions facing the risk of land abandonment (ES-1, IT-1, FR-1), but also in low intensive regions (BG-1, RO-1), financial incentives are suggested to be an essential element to maintain agricultural production at all and lay the basis for future sustainable management.

Awareness-building is seen as crucial in all agricultural and forestry context situations to improve acceptance of farmers/foresters, as well as to increase demand for public good providing management.

Another important point to be discussed at this place is the missing of regulating mechanism in nearly all mechanisms developed in PROVIDE. Here, it is to assume that this is a direct result of the co-design process of mechanisms, which involved many agricultural stakeholders in the workshops and therefore preferred mechanisms such as voluntary agreements, financial incentives and collaborative approaches.

Last but not least, in many cases mechanisms have been designed to support the provision of single public goods. It is clear that agricultural and forestry public goods are interconnected and stand-alone mechanisms as well as mixes of mechanisms, even if targeting the provision

of single public goods will have effects on other public goods. Examples are the case of clear-cutting restrictions in EE-1 and FI-1, which will contribute not only to the quality of scenery and recreational environment, but will also have effects on biodiversity and habitats, carbon-sequestration, etc. Also in DE-1, the restoration of peatland has effects far beyond carbon-sequestration, such as effects on biodiversity and habitats. In AT-1, even if the mechanisms originally target soil functionality, the management measures have impacts on water quality, habitats and biodiversity, eventually even at a broader set of PGs, like scenery and recreation, air quality, etc.

Table 2: Mechanisms optimization: approaches in the PROVIDE CSRs

	Land use system*	CSR	Public good groups					Mechanisms					Targeting		Optimisation approach
		Code	biodiv.& habitat related PG	water related PG	soil related PG	scenery & recrea-tion	rural vitality	regulation and binding standards	financial incentives	collabora-tion and partner-ships	market instru-ments	advisory & informa-tion/ awareness -building	PG targeted manage-ment	Spatially targeted mechanisms	
Financial incentives	RALUS	ES-1	x						x				x		Optimal design of public AES scheme
	FOR	EE-1				x			x			x	x	x	Optimal spatial targeting, optimal management for PG;
	FOR	FI-1				x			x				x	x	Optimal design of private PES scheme
	ILUS	IT-2		x					x				(x)		Optimal public payment scheme (collective vs. linear)
	ILUS	IT-3	x						x					(x)	Optimal public payment scheme (collective vs. linear)
	RALUS	IT-1			x		x		x					x	Optimal spatial allocation of land use
	ILUS	NL-1	x						x				x	x	Optimal allocation of measures; optimal management for PG;
	RALUS	FR-1	x	x	x				x					x	Optimal (de-)centralisation of governance
Mechanisms mixes	ELUS	RO-1				x	x		x			x	x		Optimal design of subsidies Optimal mix of mechanisms
	ELUS	BG-1		x		x			x		x		x		Optimal design of subsidies Optimal mix of mechanisms
	ILUS	UK-1.1		x				x	x	x		x			Optimal mix of mechanisms incl. public and market base financial incentives
	ILUS	UK-1.2	x					x			x	x			Optimal mix of mechanisms
	ILUS	AT-1	x	x	x				x	x	x	x	x		Optimal mix of mechanisms; optimal management for PG; optimal payment scheme
	ILUS	DE-1	x	x	**x**				x	x	x		x		Optimal mix of mechanisms, optimal management for PG;
Collective Actions	ELUS	CZ-1		x						x			x	(x)	Optimal design of collective action
	FOR	CZ-2				x				x					Optimal design of collective action

*Land use system: ILUS: Intensive land use system, ELUS: Extensive land use system: RALUS: Risk of abandonment of land use system, FOR: Forestry

1.2.2 Advantages and challenges of the participative approach of mechanisms design

The participatory approach of governance co-design pursued in PROVIDE revealed a broad range of positive aspects and advantages coming along with the integration of local-level experts and stakeholders. However, also a number of challenges related to this process became obvious. In order to support future projects targeting a similar approach, but also to inform about potential bias in the governance mechanisms developed in PROVIDE, the following section deals with the positive and also the challenging aspects.

Mutual learning and network building

The most reported positive aspect of the stakeholder integration in mechanisms design in the CSRs, was the remarkable flow of knowledge between stakeholders and researchers. The discussions with the stakeholders provided detailed insights into the specific situations of European case studies as regards public good provision, governance mismatches and into "*what works on local level, what doesn't work and why it does not work"* (AT). Mutual learning was a key advantage of participation and, in some cases, already changed the stakeholders' attitude towards public good provision and mechanisms acceptance. E.g. for the case of the German CSR, at the beginning of the process stakeholders representing the farmers in the region were sceptical about the economic viability of using cut grass from peatlands in a power plant. By discussing potential mechanisms of ensuring access to local market for cut grass and/or opening new value chain approaches with stakeholders from different fields, in the end this mechanisms was identified to be of high relevance in the governance mix for some regions and settings. Moreover, the continuity of integrating the stakeholders over the course of three years into PROVIDE, in some regions led to a strong interconnection between the partner's research institutions and the regions, as well as an improved interconnection and exchange between the stakeholders themselves. In this respect the participatory approach was beneficial to network building and the establishment of future research collaborations.

Real life solutions and practical implementation

As described, the mechanisms designed in PROVIDE are strongly based on the elaborations of the local stakeholders and experts. Here it became evident, that the stakeholders have a strong focus on reaching win-win situations through the mechanisms. The local stakeholders not only focus on ecological demand but also consider the economic perspective of the local farmers and foresters. Moreover, stakeholders put much emphasis on governance design

which promotes the provision of PGBs by agricultural systems at the minimum cost for the whole society. Consequently they try to find win-win solutions which are based on existing resources, such as existing networks, technical knowledge, etc.

Another obvious advantage of the participatory co-design process of mechanisms design is that the local stakeholders drive the attention to real life problems. This a relevant issue in relation to the fact that public good policies and instruments are more and more varied and complex, and the direct opinion of stakeholders is supportive to understand relevant entry points for governance mechanisms.

The discussion about actual governance mechanisms with stakeholders revealed concrete aspects of their application in practice. For example, using the agro-environment payments without taking into consideration the social and economic peculiarities of the areas of application may lead to a low acceptance of these measures.

Agenda setting and overruling

One of the challenging aspects of integrating stakeholders into the process of governance mechanisms design turned out to be the question of agenda setting. It becomes clear that stakeholders have very different interest as regards public good provision. Particularly in the fully voluntary process of stakeholder participation in PROVIDE (stakeholders have not been funded by the project or received any kind of compensation for the time spent), the stakeholders taking part in the workshops have usually been active persons, who have a clear interest and - in parts - also a clear agenda as regards the topic of public good provision from agriculture and forestry.

Also it became obvious in some CSRs that stakeholders differ in the intensity they pursue their goals and bring their interest and ideas to the fore. On the other hand, in some CSRs it became apparent, that stakeholders are afraid of the consequences of their inputs, so they avoid to contribute as they fear direct consequences for policy. What was learned in PROVIDE as regards agenda setting and overruling in the mechanisms design process is that proper techniques of stakeholder deliberation, avoiding to many common discussions, but splitting up the groups into world cafés, using individual and more 'neutral' ways of expressing opinions (multi-criteria analyses, opinion-cards, distribution of weighting dots, etc.) can at least lessen the problem of opinion leadership and overruling. A structured stakeholder survey, related to

the participatory approach that was carried out in FI, seems to confirm this perception: Here, evaluating the usefulness of the stakeholder integration, stakeholders particularly scored high for participatory inputs which have been assessed by the use of structured exercises (SWOT, Multicriteria analysis), while common discussion rounds received lower approval as regards usefulness. It moreover turned out to be crucial to have a good moderation and mediation process during the workshops, to make sure that the final research agenda is based not only on the opinion of only a few stakeholders. The stakeholders' inputs to the process needed critical discussions in the researchers' teams, as well as literature based adaptations, before being used in the project.

As already mentioned above, it can be assumed that the missing of regulating mechanism in nearly all mechanisms developed in PROVIDE potentially is a result of the co-design process of mechanisms, involving many agricultural stakeholders who obviously prefer voluntary agreements based on financial compensation compared to regulation and high standards of production.

Thinking big and innovative is difficult

Even if many ideas of new and more innovative governance mechanisms have been discussed at the workshops (e.g. results-based and collective schemes), the final choice of mechanisms, with actually a strong focus on classic instruments, reveals, that it is difficult for the stakeholders to propose innovative mechanisms beyond the ones currently implemented. In some CSRs it was perceived that it is easier and more workable to gather the stakeholders' critical opinion on new governance mechanisms proposed and define the researchers teams than to ask stakeholders to propose and define such new mechanisms (e.g. in ES-1). A reason for this could be that stakeholders tend to be very much driven by status quo considerations and short-term issues, which makes it difficult sometimes to think at radical changes in governance mechanisms.

The same holds for the development of bundles of governance mechanisms. For example in UK-1, even if it was tried to emphasise to think in terms of 'packages' of governance mechanisms and include novel mechanisms, after the workshop the researcher team mainly ended up with a list of existing governance mechanisms that were first not seen as a package. Difficulties in "system thinking" also became quite clear in the 4th workshops in AT and UK, where participants on the one hand argued that they could not evaluate the different

governance measures together but needed to think about them individually, while in parallel arguing that it was necessary to get away from thinking in single governance measures and towards more integrated packages.

The described issue does seem to demonstrate that this is one of the big challenges or stumbling blocks of stakeholder integration into mechanisms design – the need for more integrated approaches is clearly seen, but when it comes to dealing with them, people revert back to one-by-one approaches. In hindsight, it could have been reasonable to provide stakeholders with very specific, small scale public good issues and ask for the design of mechanisms bundle for a small areas with a defined set of actors rather than focusing on broad public issues such as 'biodiversity'. Again, this is maybe in itself an important outcome that packages can only be done at a local scale.

Knowledge distance

Even though the stakeholder integration fostered knowledge exchange and mutual learning, the knowledge distance between researcher and stakeholders, but also general knowledge gaps as regards public good provision in some cases was articulated by the stakeholders as limiting their ability to design mechanisms for improving the local public good issues.

Throughout the CSRs, as already indicated in the previous chapter, a lack of knowledge or expertise revealed as regards the definition of target levels and particularly the identification of public good related indicators. Actually, indicator setting was one of the weakest performances within the participatory approach in PROVIDE, indicating that here much knowledge needs to be transferred respectively a lot of research is still needed to develop precise, reliable and measurable indicators of public good provision.

In NL, stakeholders mentioned that they lack the knowledge necessary to assess whether a governance mechanism is 'good' or not, as for the evaluation complex economic, societal and ecological factors need to be considered, which was beyond the expertise of the stakeholders involved.

In the case of FR, the speaking of different "languages" has been identified as a limiting factor for the common design of mechanisms: Here, the regional Chamber of Agriculture and Farmers' representatives have their own definition of PES, which differs from the one in economic literature. This has led to difficulties to understand each other when interpreting

the PROVIDE results, as well as conceiving potential PES contracts. The consequence was that the researchers' team saw the necessity to interrogate themselves on the concept of PES rather than the expected outcomes by the farmers' representatives (e.g. they do not like spatially payments).

Voluntary participation

In general, the PROVIDE workshops revealed that interested stakeholders and experts participated in the workshops on a very dedicated basis. However, it had already been mentioned that stakeholder participation was fully voluntary and that stakeholders were not officially involved in the project, which sometimes made it difficult to counteract stakeholder "fatigue" and to ensure that stakeholders engage in the project over the course of the three years. In PROVIDE it became obvious that during the project number of participants has been changing from workshop to workshop. In some cases, where participation in the workshops was rather low, time consuming face-to-face interviews had to be held in the aftermath to be able to generate the necessary inputs to the project.

Last but not least it also has to be mentioned that difficulties occurred not only related to the identification of the most appropriate stakeholders, but also to persuading and motivating them to participate and contribute to the project existed, especially as the most interesting stakeholders usually are persons who are busy and often short in time.

2 EVALUATION OF MECHANISMS

2.1 GUIDING THROUGH THE PROCESS OF THE EVALUATION OF MECHANISMS

The evaluation of the mechanisms effectiveness as regards improved public good provision in PROVIDE was challenging, not only as the locally identified public good issues and the governance mechanisms were different and therefore demanded different methodological approaches for evaluation, but also as the methodological tools available in the single researchers' teams varied.

Under the condition of such variance in the basic conditions for evaluation, in order to guarantee a comparative level of evaluation by simultaneously enabling the use of a broad variety of tools, it is recommended that the approach of the evaluation of mechanism follows a structured research process with well-defined objectives and defined outcomes expected. In PROVIDE, moreover, a process of stakeholder validation of outcomes was implemented. Such validation is recommended as it enables the comparison of mechanisms at the levels of strengths, weaknesses, enabling factors and barriers for uptake (see Figure 4).

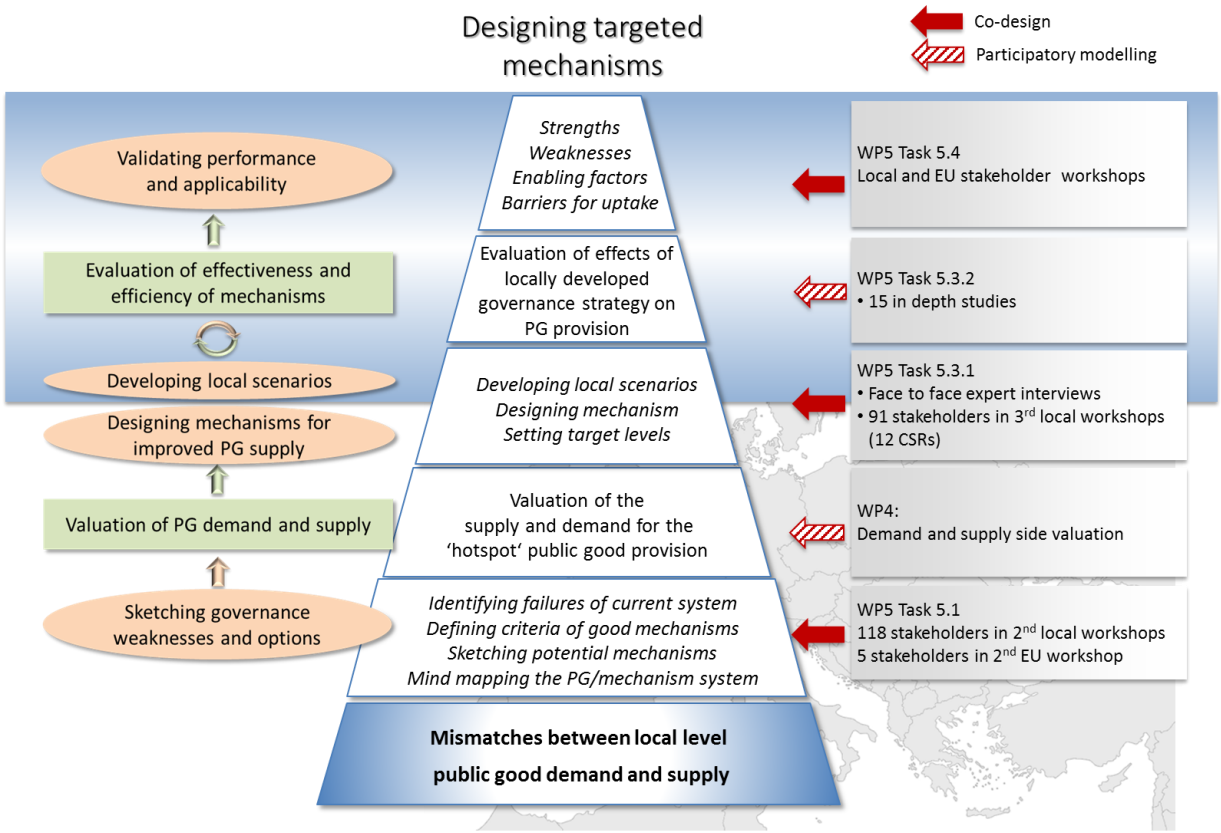

Figure 4: The PROVIDE approach of mechanisms evaluation

Based on a sound process of mechanisms design, the evaluation of mechanisms should be implemented in several steps, with the following 4 objectives:

- Objective 1: Developing local scenarios of socio-economic and natural development
- Objective 2: Choosing suitable methodological tools for the evaluation of the effectiveness of mechanisms
- Objective 3: Validating performance and applicability of mechanisms
- Objective 4: Validating the transferability of mechanisms

2.1.1 Objective 1: Developing local scenarios of socio-economic and natural development

In order to dynamically model the performance of promising governance strategies under the conditions of a changing future, scenarios need to be developed. The expected outcome of the development of scenarios should be probable and relevant scenarios of socio-economic and natural development, specifically adapted to the region of PGB provision.

Operationalisation: The example of PROVIDE

In PROVIDE, 3 future scenario narratives, describing possible social, economic, technological and policy pathways on global level under a business-as-usual, market driven and sustainability driven development, have been developed at an earlier stage of the project (Schaller et al., 2017). These scenario narratives were then adapted to the local context of the PROVIDE CSRs either by integrating the knowledge of local stakeholders or experts. The discussion of the global scenario narratives with stakeholders and experts took place either as an additional activity in the 3rd local stakeholder workshops, or in form of individual stakeholder integration carried out as extra workshops or individual interviews. Regardless the format, the first step of scenario building had been the introduction of the overall scenario narratives to the stakeholders. In the following, stakeholders identified the main effects of the single scenario narratives on the specific situation in the case study such as on agricultural production, natural conditions, socio-economic conditions, price developments and resulting market conditions, etc. Moreover, stakeholders estimated the main effects of the single scenario narratives on the provision of the PGB issues in their CRS and scored, which of the single parameters of the overall PROVIDE narratives (climate change, population development, consumer behaviour/WTP for PBG, prices of natural resources, market price volatility, technical progress), have the strongest effects in general, and on the provision of

public goods in their CSR. Last but not least stakeholders discussed, which effects the local scenarios have on the effectiveness and efficiency of the governance strategies developed and which governance strategies are to be preferred under the conditions of the different scenarios. The locally adapted scenarios were reported in form of reporting templates and were directly integrated into the evaluation exercises.

2.1.2 Objective 2: Choosing and applying suitable methodological tools for the evaluation of the effectiveness of the designed mechanisms

To analyse the effectiveness of the locally developed governance strategy as regards public good provision, governance mechanisms have to be evaluated by the use of suitable quantitative or qualitative methodological approaches. The evaluation tools and models need to be selected with regard to their applicability in the case study and the respective public good context. Moreover, the decision on methodological evaluation approaches should be based on the best ability to meet the evaluation requirements identified through the definition of public good targets and the selection of governance mechanisms and strategies.

The expected outcome of mechanisms evaluation should be estimates on the effects of an implementation of the governance strategy. These should consider the envisaged target levels of public good provision and the probable scenarios on socio-economic and natural development, on the levels of provision of public goods, and/or the levels of avoidance of public bads.

Operationalisation: The example of PROVIDE

In PROVIDE, the choice of evaluation approaches was fully free for the partners. However, the models applied needed to be able to assess whether it is possible to achieve the public good targets level with the chosen governance strategy and (if applicable) at which costs. Furthermore, models should be capable to directly integrate region-specific development scenarios and measure the scenarios' impact on PG provision. The evaluation of the effectiveness of the mechanisms itself was then mainly based on desk research within the researchers' teams' institutions. In some cases however, participatory modelling approaches have been chosen. In these cases, again extra workshops focused on modelling, or individual interviews with stakeholders and experts have been organized in the respective CSRs. The results of the studies have been reported in the format of identically structured reports, which

on the one hand have been summarised into short abstracts to be presented in the PROVIDE toolbox and to be read at a glance in deliverable D5.2. Also the full studies are available in Annex 1 to D5.2 (Schaller et al., 2018).

2.1.3 Objective 3: Participatory validation of performance and applicability of the mechanisms

The second last step of mechanisms evaluation should be the validation of the performance and applicability of the mechanisms as regards their major strengths and weaknesses, enabling factors and barriers of their uptake as well as their performance against criteria of good governances. The expected outcomes of this validation process should be i) an overview on factors external to the governance mechanism which may promote or inhibit uptake, and therefore success, ii) an comprehensive overview on the internal strengths and weaknesses of each mechanisms, an estimation of the mechanisms performance in being "good" in terms of fulfilling criteria of good governance. Such 'good governance' criteria must be carefully selected to meet the needs of the governance mechanisms.

Operationalisation: The example of PROVIDE

In PROVIDE, the identification of strengths and weaknesses, as well as the identification of enabling factors and barriers for uptake, were based on a participatory approach and carried out as part of the activities of the 4th local stakeholder workshops, which was held in line with WP2, Task 2.2, involving 107 stakeholders in 12 countries (Roberts et al., 2018b). Additionally interviews and an online survey completed information that could not be gathered in workshops.

In the workshops, the strength, weaknesses, enabling factors and barriers for uptake have been identified in an adapted SWOT analysis, in which workshop participants were asked to identify perceived strengths, weaknesses, opportunities/enabling factors and threats/barriers that were likely to influence the performance of governance mechanisms overall. Moreover, by means of a multi-criteria analysis stakeholders evaluated how the suggested governance mechanisms perform (or score) against the previously identified strengths, weaknesses, enabling factors and barriers, as well as against selected criteria for 'good governance' which had been identified in the first step of participatory governance design (Roberts et al., 2018b).

2.1.4 Objective 4: Assessment of the transferability of mechanisms

The last step of governance evaluation should be the assessment of the transferability of governance mechanisms considering specific criteria for policy transfer. The expected outcome of this assessment should be a mechanisms-specific overview on the mechanisms transferability to other regions, context situations and public good issues.

Operationalisation: The example of PROVIDE

In PROVIDE, the assessment of transferability was based on a broad literature review, in which the main criteria influencing transferability of governance mechanisms between locations have been identified (Roberts et al., 2018b). Based on these criteria, each mechanism proposed by the CSRs were scored against the criteria by the task leader, and validated by the partners' teams responsible for the single CSRs.

2.2 LESSONS LEARNED FROM THE EVALUATION PROCESS

As already shown, the 3 main pathways of improving mechanisms for better public good provision elaborated in the PROVIDE regions were 1.) to improve financial incentives (e.g. better targeting as regards types of farmers/foresters; better spatial targeting of measures; new, more performance oriented payment schemes such as payment for ecosystem services or collective payment schemes like agglomeration bonus or collective bonus or better level of administrative steering), 2.) to improve the orchestration of different and better mechanisms in mechanisms mixes (e.g. a regional, collaborative partnership supports the development and implementation of an improved, bonus-oriented payment scheme, moreover market opportunities for marketing the public good friendly products are opened up) and 3.) to develop bottom-up approaches such as collective actions and embed them in existing regional network mechanisms such as the LEADER approach (Figure 1) (Schaller et al., 2018).

The evaluation carried out in order to assess the effects of these optimization pathways on public good provision in the CSRs showed that mathematical modelling approaches are particularly suited and have therefore been preferably chosen for evaluating improvements in financial incentives, particularly when those are analysed as stand-alone mechanisms (ES-

1, EE-1, IT-1, IT-2, IT-3, NL-1, FR-1). Also in mechanisms mixes, where financial incentives represent the key element, mathematical modelling approaches have been chosen to assess the mechanisms effects on PGBs provision (BG-1, RO-1). Participatory modelling approaches appear suited particularly for the evaluation of optimised mixes of governance mechanisms, as well as for the evaluation of the potential effects of collective actions (AT-1, UK-1, DE-1, CZ-1, CZ-2).

During the first step of the evaluation of mechanisms, that is the development of local scenarios, it became clear that the choice of evaluation models determines the broadness, in which natural and socio-economic regional developments can be considered in the evaluation process. While in participatory modelling it was easier to integrate comprehensive scenarios of future development, characterised by a broad range of parameters, in the mathematical models scenarios had to be condensed to only few, single and quantitative indicators of development, suited to be integrated into the mathematical modelling structure (Schaller et al., 2018).

In some cases of mathematical modelling however, the characterisation of these parameters was based on the stakeholders

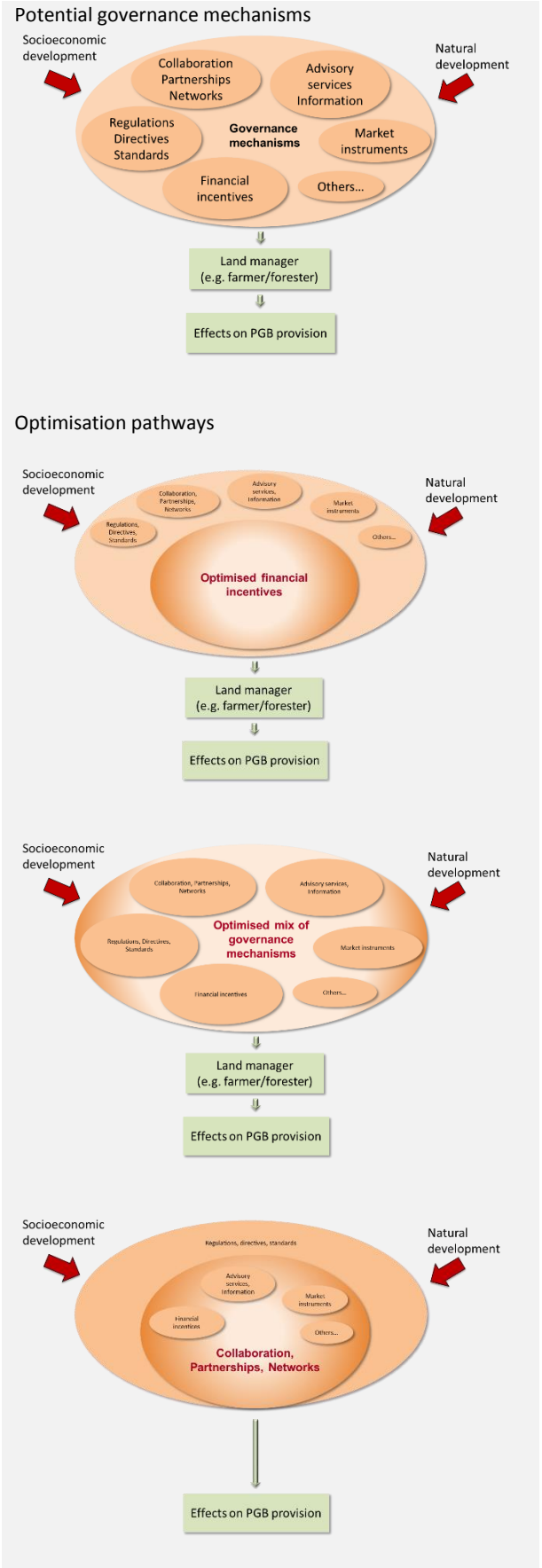

Figure 5: Pathways of optimising governance mechanisms for public good provision in PROVIDE

estimations on the future natural and socio-economic development in the regions: For example in the modelling exercise in EE-1, scenario indicators about the pace of concluding management agreements with private and public forest owners, expressed by share of forest area managed under the requirements of the agreement in the course of time, as well as price levels of compensation were based on stakeholder perceptions on changes of consumption patterns and the related social pressure to change forests management, changes in prices of timber and the changes in the awareness of the forestry sector under the conditions of BAU, sustainable development and market driven development scenarios. Also in ES-1 and FR-1, the characterisation of scenario parameters useable for the mathematical modelling (changes in cost of PGB provision, changes in opportunity costs, changes in local demand for PGB provision, social benefits from PGBs, monitoring cost and marginal costs of public funds) were based on the stakeholders estimation of natural and socio-economic development in the region. In some cases of mathematical modelling, scenarios in contrast were fully built by the researchers. In IT-3 for instance, theoretical scenarios related to the composition of farmer population and changes in the levels of payment, in BG-1 to changes in levels of fertilisation and payment levels of different financial incentives, in RO-1 to prices for farm inputs for specific farm types and prices of agricultural products and in IT-1 to different PG combinations considered in the maximisation problem and different levels of prices were set for modelling effects of the implementation of mechanisms.

For the participatory modelling approaches, the focus of the scenarios was rather on the socio-economic and natural development in the regions. For example in AT-1, DE-1 and UK-1, the scenarios considered different expressions of e.g. the intensity and type of agricultural production, weather conditions, regional land use in general, the influx of population into the region, the demographic development, resource scarcity, etc., and the related effects on the provision of the most important public good provision under the conditions of the overall PROVIDE scenario narratives of BAU, SD, and MD. More specific developments, however still in the form of regional scenario narratives, have been developed in FI-1, where the development of tourism plays an important role for the public good issue addressed, as well in the two cases dealing with collective action in Czech Republic, where for the case of water availability different combinations of climate change (precipitation) and CAP support, for the case of establishing a collective action for better management of a Geopark different combinations of funding types and participation options have been developed.

Besides the obvious differences in the demands for scenario development and integration into the evaluation exercise, it was also learned from the discussion of the methodological approaches of the single evaluation studies (Schaller et al., 2018), that the different modelling approaches bring along different advantages and disadvantages as regards their ability to assess the mechanisms impacts on the improvement of public good provision and the avoidance of public bads on regional level, as well as their behaviour under the condition of changing futures.

A major advantage of mathematical modelling is quantification, which allows a clear distinction to be drawn between the output variables' values achieved in different scenarios. This, in turn, provides a basis for benchmarking the efficiency and effectiveness of the strategies. Also, as soon as suitable and quantifiable scenario parameters are at hand, their integration is normally easy and their effects on the efficiency and effectiveness of the mechanisms can be reflected and compared directly. The inclusion of a high number of variables and restrictions possible in mathematical modelling represents another important feature. Another major advantage of the mathematical modelling approaches analysing policy changes ex-ante identified by the researchers is the transparency of modelling assumptions and therefore also the modelling results. The mathematical models mostly allow easy adjustments of the assumptions after the discussion and validation of results. As soon as the models are developed, and parameters are quantified, they therefore might allow the creation of simulations and solutions through calculation tools which in the best case can also be available for stakeholders.

Nevertheless, mathematical modelling also brings along some challenges and disadvantages that need to be considered when interpreting the results. Even if the mathematical models used in PROVIDE were distinctively applied and designed for dealing with empirically assessed, regional public good issues, specific types of co-designed mechanisms, empirically gathered data on demand and supply, and in many cases integrating participatory designed scenarios of future development, they still remain theoretical models of reality, which are necessarily characterized by simplification. It was repeatedly discussed by the researchers' team, that the models are only as good as the data available to feed them and the accuracy of the underlying assumptions e.g. the specification of calculation functions (e.g. IT-2) or the parameters assumed to define the system.

It became obvious that most models react highly sensitive on changes in parameters feeding the models, the lack of accurate information for these parameters therefore very likely prevents researchers from achieving results precise enough to directly support policy-making. The information to build the models available in PROVIDE, having had the advantage of an intensive research process over the course of 3 years, particularly for complex models such as the Principal agent model (PAM) in ES-1 or the Principal component model (PCM) in BG-1, in the "real world" is not available through official statistics, but rather needs to be generated in a specific way for each case study. The time and high costs involved in generating this information might not be consistent with current political decision-making practices. As such, comprehensive analyses of this sort would only be feasible for the design of large-scale mechanism, where the transaction costs relating to the design of the instrument are of a smaller order of magnitude than the welfare improvements that can be achieved.

As regards the distinctively participatory modelling approaches carried out in PROVIDE, also these are characterised by strengths on the one hand and challenges on the other. The studies applying fuzzy cognitive mapping (FCM) (AT-1, UK-1, CZ-1, CZ-2) revealed, that the participatory modelling approach, allowing stakeholders to directly influence the design of the model as well as the modelling outcomes, was particularly suited to characterise and understand the various factors that influence the mechanisms-public good system and the complexities within it. The cognitive maps as defined during the stakeholder meetings concern a wide range of factors and relations. The fuzzy cognitive mapping is therefore a suitable tool to understand more in depth the problem, and the range of possibilities to define effective governance mechanisms. A specific advantage of the method concerns the possibility to include "soft" issues like social demand or awareness or farmers' motivation and ability of adoption. Also the integration of scenarios into the FCM models is possible. As already mentioned, the big advantage as regards scenarios in the participatory modelling turned out to be that complex scenarios of natural and socio-economic development can be integrated, as these can be digested by the experts taking part in the exercise and translated into the relationships and the related scores in the systems (UK-1, AT-1). Alternatively, e.g. the approach in CZ-1 and CZ-2 showed, that the system parameters identified in FCM can be used for feeding external tools of scenario evaluation (MAPP in the specific cases of CZ-1 and CZ-2)

Despite the advantages of fully participatory modelling, for the quantitative evaluation of the efficiency and effectiveness of the selected governance mechanisms, FCM is only suited to some extent. The models allow very good insights in what drives the effectiveness of the mechanisms in the systems, and also how mechanisms influence each other, however, the final effectiveness of mechanisms on public good provision in such system models can rather be evaluated in relative terms by comparing the impacts of individual governance mechanisms to each other and to the impact of all the governance mechanisms combined. Another challenge of particularly the direct influence of the stakeholders on the design of the model was that this participation resulted in quite complicated models characterised by a multitude of factors and relationships. While most probably being a good representation of the "real world", the highly complex models showed very low levels of change no matter of the scenarios run (UK-1). On the one hand, it was discussed that also the FCM is still a model, and as such also affected by the risk to oversimplifying the system. Another critical point of course is the scoring itself. E.g. in the Czech studies, it was found that it was not easy to assure consistency of judgements and to state ordinary sets of scores capturing more than one dimension; e.g. period of the effects (short to long terms) and territorial coverage (marginal coverage to the entire territory) – while here multi-criteria judgement seems to be desirable.

The last modelling approach to be discussed should be the semi-participative approach of multi-criteria analysis in the Finnish CSR. In FI-1 a Multi-Criteria Analysis (MCA) has been used to identify and evaluate improved and targeted PES. The strength of the applied MCA-based evaluation is that the predefined decision tree, integrating the result from the earlier steps in the project, forced the experts to focus their work and subjective evaluations on the same topic and prevented them to become too complex. For instance instead of discussing minor/irrelevant or only some specific topic related to LRVT, they were demanded to make a holistic assessment of alternatives. In addition, the results are quantitative and they can be tracked to the priorities of the criteria, to the specificities of different scenarios as well as the evaluation of the performances of PES alternatives against the criteria. The approach also enables the participants to truly express their subjective preferences against the factors of the decision hierarchy. At the same time, the limitation is that the factors that have been left outside the hierarchy are not included in the evaluation. Same holds with the predefined alternatives - only limited number of discrete alternatives could be evaluated.

The results of the evaluation exercises have been described in detail in deliverable D5.2 (Schaller et al., 2018). However, some key lessons learned from the evaluation results shall be highlighted at this point:

From the evaluation studies dealing with the improvement of financial incentives, it becomes obvious that even if presenting a "classic" way of supporting public good provision, they are still of utter importance and are worth to being further developed into more effective schemes. The PROVIDE studies showed, that the effectiveness of financial incentives could be particularly enhanced by better targeting, such as better targeting of management restrictions to the public good addressed (e.g. ES-1, EE-1, FI-1, AT-1, BG-1), better targeting of the payment levels to actual costs and to appropriately balancing demand and supply of PGB (e.g. BG-1, RO-1), better definition of the target area of public good provision and therefore the area where mechanism are available (EE-1, NL-1, FI-1), better definition of the target groups of farmers/foresters having access to the mechanism (e.g. ES-1, EE-1), or better identification and targeting to the users/beneficiaries and therefore the "buyers" of public good provision (e.g. FI-1). Also shown in many studies, new and more performance-oriented schemes could replace classic linear area payments. Potential is particularly seen in private or public PES schemes (FI-1, FR-1), in direct contract agreements (EE-1) and in collective incentives, such as collective bonus for the implementation of conservation agriculture in a certain area, or agglomeration bonus for area devoted to nature conservation for biodiversity and pollination services (AT-1, IT-2, IT-3).

From the evaluation studies dealing with the effectiveness of mechanisms mixes, it became obvious that such mixes are not only suited to enhance public good provision, but particularly to stabilise the system of PG provision (AT-1, UK-1). While also here financial incentives represent keystones in the governance strategies, it becomes evident that the adoption of PG-friendly management strongly depends on supporting instruments, such as collaboration between stakeholder, market driven instruments, education and information and awareness-building. It could be shown that particularly under the conditions of unfavourable futures, financial incentives without the support of a surrounding governance system are incapable to support public good provision, no matter the amount of money spent to compensate management changes (e.g. AT-1, DE-1).

As regards bottom-up approaches, such as collective actions and their integration into existing network structures, the evaluation studies showed that such approaches can have high potential, even if their organisation and implementation is not always easy. Collective approaches of governance and steering are strongly dependent on the commitment of the partners united under the approach and therefore only recommendable if compliance to the fundamental principles of collaboration are guaranteed.

From the 3rd step of mechanisms evaluation carried out in PROVIDE, that is the participatory validation of performance and applicability of the mechanisms, different lessons can be learned (Roberts et al., 2018b). Through the technique applied for the stakeholder exercise, namely SWOT and multi-criteria analysis (Roberts et al., 2018b), information on the performance of governance mechanisms for improving PGBs could be gathered in an easy, uniform way across all CSRs while still addressing the specific mechanisms designed in the regions. The strengths, weaknesses, enabling factors (opportunities) and barriers to uptake (threats) identified for the single mechanisms in the single CSRs revealed, that these are strongly tied to the context in which the governance mechanism is supposed to intervene. The strengths and enabling factors, as well as the weaknesses and barriers for uptake, identified to making a specific type of governance optimisation successful or unsuccessful in one location, do not guarantee that a similar mechanism will be successful respectively unsuccessful elsewhere. Though some similarities can be identified, the analysis therefore again revealed that it is of high importance to understand the context into which governance mechanisms are to be placed. From this result it can be derived that an analysis and recognition of the states of enabling factors/barriers would allow policy makers and land managers to address potential barriers prior to implementing governance mechanisms, increasing potential for success.

Despite the high context specificity of the SWOT factors, some common statements particularly on enabling factors (where enabling factors and barriers to uptake can be recognised as paired, with many enabling factors identified as barriers when not present) can be made. Across all CSRs and mechanisms the political stability alongside public and stakeholder support was identified as having large impacts on the uptake of the mechanisms. Particularly for supporting mechanisms in mechanisms mixes, such as advisory and information or market instruments, as well as for mechanisms based on collective approaches

the awareness and interest of stakeholder is a crucial factor. This result suggest that awareness building campaigns as well as the integration of stakeholders into the design process of such measures is an important factor for success.

A perhaps foreseeable, yet not trivial, factor particularly for the success of financial incentives, but also for the successful organisation within collaborative approaches, is sustainable and equitable funding. The stakeholder validation made clear, that the funding base must be reliable and on the one hand guarantee fair and adequate compensation, on the other guarantee this compensation over the course of time the mechanism is in place. Insecurities of funding might be one of the most important obstacles to participation in measures which require management changes that lead to reduction of agricultural and forestry income.

As regards the consideration of future scenarios, the validation of the applicability of the mechanisms brought to the fore a remarkable threat perceived by the stakeholders, namely climate change. In many regions climate change and the related effects on agriculture/forestry production are assumed to cause shifts in management, the provision of public goods and also the demand for them. Consequently, success is predicted particularly for mechanisms which are able to take account of the threat of climate change.

Last but not least across multiple CSRs, connections to and synergies with existing policies are recognised as an important enabling factor and, if given, a definite strength. Connection to existing policies not only suggests that mechanisms will be easy to administer, but also that they will be readily accepted (as they follow enacted policies), and that they align with stakeholder and policy maker needs. Insofar, a gradual shift particularly for the current public financial schemes provided in the framework of the CAP to more result-oriented schemes could be recommendable, progressively changing from practice-based to results-based approaches. A gradual shift might increase the certainty about the results to be achieved (i.e. increase in the provision of public goods), although there are some concerns about the higher monitoring costs, taking into account that checking the results is more difficult than monitoring the implementation of practices.

The last step of the evaluation of mechanisms, the assessment of the transferability of mechanisms, has been carried out for each of the governance solutions in the single CSRs and in detail be reported in D5.3 (Roberts et al., 2018b). Also this assessment revealed that the complexities of producing public goods from agriculture and forestry complicates

transferability of governance mechanisms. However particularly mechanisms addressing single goals, with actions directly linked to outcome, using simple actions and building on existing policies are most likely to be transferable. Immediately this of course means that combinations of mechanisms, which might be very successful in one regions as they fully capture and take into account the overall system of public good provision in the specific context of the CSR, may have limited transferability into other regions and contexts.

A very important lesson learned in the evaluation process becomes obvious when combining the results of the validation of the performance and applicability of mechanisms with the question of transferability. In particular the performance criteria as regards the effectiveness of mechanisms might be the ones hindering its transfer to other contexts. For instance particularly such mechanisms are considered to be highly transferable, where the scale of change is small, while when considering criteria of performance, such mechanisms may be evaluated to perform only poorly. Such mis-matches between criteria of good governance mechanisms and mechanisms with high transferability represent clear challenges for designing governance mechanisms for PGB provision across the EU. A recommendation from this outcome might be that a dynamic approach to governance mechanisms may be considered, in which mechanisms are first designed for transferability, and adapted locally once established. Such an approach to governance mechanism design would benefit from further exploration (Roberts et al., 2018b).

3 PROVIDE MECHANISMS TO BOOST THE PRODUCTION OF PUBLIC GOODS BY AGRICULTURE AND FORESTRY – DESCRIPTION, EVALUATION AND POLICY RECOMMENDATIONS

In this chapter, the different mechanisms developed in PROVIDE in order to boost the production of public goods, are presented one by one in form of "fact sheets". The fact sheets shall enable a direct and fast comparison of mechanisms in terms of mechanisms design, potential evaluation method suited to evaluate effectiveness, indicators of measurement, and overall effectiveness of the mechanisms as regards public good provision. Moreover, an overview on most important strengths and weaknesses, and the enabling factors and barriers of uptake is given. In the case of strong overlaps of that strengths and enabling factors, or weaknesses and barriers for uptake, these evaluation categories are grouped together. Furthermore, the estimation of the mechanisms transferability (drawn from the results of D5.3, (Roberts et al., 2018b)) are taken up. Last but not least, policy recommendations for the implementation of the mechanisms are given.

The chapter is structured along the pathways of mechanism optimization and starts with factsheets of improved financial incentives. Presented are examples of *1.) contractual agreements between private forest owners and local government; financial relief scheme for state-owned forest, 2.) targeted agri-environmental schemes, 3.) classic agri- environmental schemes, 4.) payments for Ecosystem services, 4.) linear subsidy vs. collective bonus, 5.) Agglomeration bonus vs. traditional AES, 6.) Rural development programs, 7.) landscape function optimisation for improving nature management plans (NBP) and 8.) decentralisation of policy and payments for ecosystem services.* The chapter continues with two examples of mechanism mixes with a strong focus in financial incentives namely 1.) a m*ix of mechanisms for improving natural landscape quality and 2.) a mix of mechanisms for improving water quality, food security and scenery and recreation.* Then 3 examples of comprehensive mechanisms mixes for the improvement of 1.) *water quality and biodiversity, 2.) soil functionality, water quality and habitats and biodiversity and 3.) climate stability, water quantity and biodiversity* are given. The chapter closes with 2 examples of fully collective approaches, namely 1.) a *collective action based on LAG for water availability and 2.) an approach fostering broad stakeholder integration.*

3.1 OPTIMISED FINANCIAL INCENTIVES

3.1.1 Contractual agreements between private forest owners and local government; financial relief scheme for state-owned forest

CSR context	○ *EE-1: Limiting forestry clear-cutting and therefore improving the PG of scenery and recreation in Harju County, Northern Estonia*
Description	○ *Spatial planning, Contract agreements with private forest owners and financial relief schemes for state owned forest, technical assistance and information; the financial incentives are related to specific cutting restriction in spatially targeted forest areas*
Evaluation method	○ *Spatial analysis for defining the target area and a mathematical model for the assessment of the effects*
Indicators of effectiveness	○ *Forest area covered by agreements of forest management separately in private and state forest, public sector financial commitments taken with the agreements reflecting the cost of improvement of providing PG.*
Effectiveness	○ *Only 26% of the total area is covered by the most valuable forest types as regards PG provision and should therefore be target of the schemes. Results demonstrate that the governance strategy is effective to prevent clear cutting in these target areas and can improve the provision of the PG of good-quality forest scenery and recreation opportunities in the target area - forest stand compartments in towns, densely populated areas and within a 100-meter-wide surrounding buffer zone. The modelled increase of the main indicator forest area, in the state forest reaches more than 500 ha in case of all scenarios. In the private forest it can reach from about 500 to 700 ha depending on scenarios. All together, 30-37% of the total target forest area. The total public financial commitments in amount of 38-45 MEUR are forecasted.*
Main strengths	○ *Environmental support rate is attractive* ○ *Mechanisms is simple and easy to apply* ○ *Reliability and sustainability of financing the strategy*
Main weaknesses	○ *No environmental support for less valuable forest types* ○ *High percentage of passive, bystander and indifferent types of private forest owners* ○ *Efforts of private forest owners to avoid all kinds of public restrictions for forest use*
Enabling factors	○ *Growing appreciation of sustainable use of forest and Ecosystem services by the public* ○ *Growing capacity of municipalities to create recreation opportunities in the open air* ○ *Involvement of private funding* ○ *Activation of forest owners*
Barriers for uptake	○ *Scarce funding of environmental support* ○ *Growth of demand for purchase of forest land for real estate development* ○ *Making conclusions of contracts compulsory*
Transfer-ability	○ *Overall the proposed mixture of mechanisms to improve natural landscape in forestry in Estonia are challenging to be successfully transferred. Although the mechanisms proposed have a direct relationship to the problem, and are well established across the EU, the large scale of change and costs will most likely present a barrier to transferability.*
Policy recommenda-tions	○ *To ensure participation of private forest owners in the agreements, it is important to involve them in the spatial planning of forest use in the county and then inform the owners about the possibilities of financial compensation. This helps to raise their awareness of the importance of PGs related to certain forest stands compartments that they own, possible agreements and financial compensation related to cutting restrictions. Participation of a remarkable part of private forest owners in the agreements is plausible according to the stakeholders. In particular, the participation of active forest owners (about one third of owners) is likely. In addition, a part of the usually non-active forest owners can be attracted by the opportunity of receiving financial compensation*

3.1.2 Targeted agri-environmental schemes

CSR context	○ *ES-1: Improvement of biodiversity in the Andalusian mountain olive groves in Spain under the condition of land abandonment*
Description	○ *AES with modest environmental objective, relatively low agri-environmental payment (slight below €100/hectare), and high monitoring level (15%).*
Evaluation method	○ *Principal Agent Model*
Indicators of effectiveness	○ *Improvement of social welfare (€/ha*year)* ○ *Enhancement of biodiversity (bird species/ha) -although a larger reference area, like 10 ha, can be used)* ○ *Share of agri-environmental payment contribution to compensation (%)*
Effectiveness	○ *An implication of the new AES, focusing on the 60% of mountain olive growers more prone to participate, with higher monitoring rate and tougher sanctions compared with AES currently implemented, would increase social welfare.*
Main strengths	○ *Instrument well known among farmers* ○ *Promotes a change in farmers' perception with regards to the compensation they receive for the provision of PGs (implementation of the "providers get" principle)* ○ *Promotes the dissemination of good practices and innovation (especially at early stages of adoption)*
Main weaknesses	○ *High transaction costs for the administration (in particular, with regards to design due to lack of information)* ○ *Uncertain real effects (because of practice-based implementation)* ○ *Information asymmetry (especially due to adverse selection) resulting in inefficiencies*
Enabling factors	○ *Potential synergies with other policies (environmental, regional and cohesion policies)* ○ *Future monitoring (ICT/big data), decreasing monitoring costs through simplification* ○ *Society's increasing positive perception towards PGs provided by agricultural systems*
Barriers for uptake	○ *Sociocultural context (ageing, low level of education, etc.) preventing the adoption of innovative initiatives* ○ *Changing instrument because of changing policy priorities (new RPD every programming period)* ○ *Future budget allocation and financial restrictions (at EU and CAP level)*
Transfer-ability	○ *Overall AES to reduce land abandonment could be expected to be readily transferable, as the mechanism is straightforward and highly connected to the PGB, providing the reasons for land abandonment are fully understood and accounted for.*
Policy recommenda-tions	○ *AES is a useful policy instrument to enhance social welfare by improving the provision of public goods by agriculture. However, it is also shown that net social gains expected from the implementation of AES are moderate, as the ratio between gains and public expenditure is low* ○ *The results prove the usefulness of a higher targeting focusing on those farmers more likely to enroll in AES. In particular, in the ES-1 case study, it is evidenced that there is group of olive growers willing to participate in AES at low payment levels, while there is another group that would only participate at very high payments (e.g. three-times the payment accepted by the first group). Logically, policy-making should focus the implementation of schemes on the first group* ○ *However, as we find that increasing social benefits very much impact on the net social gains obtained for optimal scenarios of AES implementation, and given the positive trend of them connected to a higher environmental awareness of the general public, higher net social gains are expected in the future as a result of AES implementation* ○ *Finally, it is worth remarking that only 12% of the AES payments are used to compensate extra cost involved in the enhanced provision of public goods, while the remaining 88% serve as additional profit for farmers. The results suggest that this percentage can be balanced by implementing schemes with tougher sanctions, which would also imply an increased provision of public goods and net social gains. In addition, this result makes a strong case for the implementation of innovative results-based approaches, in order to effectively remunerate the higher costs of increased provision of PGs incurred by farmers.*

3.1.3 Agri-environmental schemes

CSR context	○ *PL-1: Improvement biodiversity in the the Biebrza river valley in Poland*
Description	○ *Agri-environmental schemes; annual payment/ha for adopting special practices*
Evaluation method	○ *Discrete choice experiment to assess willingness to accept AES*
Effectiveness	○ *Substantive differences in mean willingness to accept for 7* ○ *agri-environmental practices (as presented)* ○ *Strong heterogeneity of preferences (st. deviations)* ○ *Preference for elasticity (shorter contracts, option to cancel)* ○ *Positive correlation of preferences to participate in different* ○ *contracts* ○ *Willingness to accept decreases with experience in contracts implementation and specialization (crop farms, dairy farms)* ○ *Some, but no systematic effects of other variables (information, socio-economis variables) appeared to be contract-dependent*
Main strengths	○ *Significant environmental benefits* ○ *Popularization of good practices amongst farmers* ○ *Fit to local characteristics*
Main weaknesses	○ *Little flexibility* ○ *AES effectiveness is difficult to monitor* ○ *No popularity amongst farmers*
Enabling factors	○ *Increase of flexibility* ○ *Increase of fit to local characteristics* ○ *Increase of payments* ○ *Increase of coordination of schemes* ○ *Increase of match with market conditions* ○ *Increase of ease of implementation* ○ *Stable long-term financing*
Barriers for uptake	○ *Decrease of payments* ○ *Decrease of flexibility* ○ *Decrease of availability of the program* ○ *Increase of costs of enrolling into AES*
Transfer-ability	○ *AES have some transferability, but needs to take account of the local context, as well as understanding the many interconnected links in improving biodiversity.*
Policy recommenda-tions	○ *Optimal duration of contracts needs to be a consensus between elasticity and log-term perspective of environmental goals;* ○ *size of payment is now based on principle of compensation for profits foregone, which means also no differentiation of payments despite the heterogeneity of farms (ex. payments too low for small farms);* ○ *transferability of estimated costs of PGs provision to other regions is limited, because current agri-environmental policies very different in different countries (there might be strong anchoring effects); on the other hand determinants of costs have higher potential of transferability (recommendations on the design and targeting of agri-environmental schemes);* ○ *there is a need for closer monitoring of effects or ownership of some, environmentally valuable, areas by the state;* ○ *there is a problem of disempowering of local groups (local knowledge & social relationships): the problem is a rigid implementation of contracts regardless of changing weather and flooding conditions controlled by centralized authorities | inadequate to local conditions;* ○ *there is no principle of habitat uniqueness; universal schemes (some habitats are too rare to be on the AES list);* ○ *need for feedback and cooperation between groups of interest;* ○ *anxiety about long-run EU funding of agro-environmental schemes.*

3.1.4 Payments for ecosystem services

CSR context	○ *FI-1: Limiting forestry clear-cutting and therefore improving the PG of scenery and recreation in Ruka-Kuusamo in North-Eastern Finland*
Description	○ *PES scheme, where obligatory payments of tourists compensate income losses, which are experienced by the forestry sector due to management restrictions*
Evaluation method	○ *Multi-Criteria analysis*
Indicators of effectiveness	○ *Expert scores*
Main strengths	○ *Secure funding base* ○ *Most essential parties included* ○ *Accepted and tested model from visitors' perspective*
Main weaknesses	○ *Additional bureaucracy* ○ *Varying allocation of benefits and disadvantages* ○ *Non cutting doesn't always increase quality of landscape*
Enabling factors	○ *Fixed-term contracts help the decision making of forest owners* ○ *Competitive tendering increases the obtaining of target sites* ○ *Benefits from better image for the region*
Barriers for uptake	○ *How and who selects target sites even-handedly* ○ *Differing views between companies and forest owners about the selection of target sites* ○ *Competitive tendering does not select the most desirable target sites*
Transferability	○ *Payments for forest recreation services are likely to be easily transferred between locations, given the direct relationship between PGB and mechanism, low costs and small scale of change.*
Policy recommenda-tions	○ *Under the premise of different criteria of good governance, and also from the point of view of different sectors (forestry, tourism, public administration) different schemes are preferable. While e.g. for the criteria of spatial targeting the obligatory payments appear best suited, for the criteria of administrative easiness PES schemes between tourism companies and the forestry sector appear more applicable.* ○ *There is need to further encourage the actors to participate to development of the suggested PES system. During the study, public sector and forestry representatives participated to the development work more actively whereas the participation of tourism sector was much less active. This is also a signal of imbalance and should be solved before next steps to reach a wider acceptability.* ○ *There is need to develop even more detailed PES solution for the area and pilot it in practice in real settings.* ○ *Although the aim is to run the suggested PES with private funds collected from visitors, public funding, e.g. from the local municipality, is probably needed at least in the starting phase of the implementation process.* ○ *In the beginning of the implementation of the system, there is a need for a thorough and in-depth information and communication process among both local forest owners and tourism entrepreneurs. The process is needed for creating confidence to both the functioning of the system and between the parties.* ○ *Possibilities for joint production of ecosystem services should be further analysed, in particular, if public funds for biodiversity protection and private funds for enhancing landscape values can be successfully combined to create larger forest entities with high amenity values in the future.* ○ *It is expected that the demand for timber will increase as there are plans to build new timber based industry in northern Finland. This development would increase the need to develop and adopt the suggested PES system rather quickly. It is difficult to evaluate how the priorities of the alternative PES systems would change in this situation, although the need to include more forest areas in the PES perhaps suggest that the obligatory PES alternative would be needed even more to secure the funding. In addition, higher timber prices will result in increased opportunity costs for other uses too.*

3.1.5 Collective approach in different access management options

CSR context	○ *IT-2: Improving water availability in the hilly and mountain area of the Ravenna province in Italy*
Description	○ *It is analysed how different rules, namely open vs. closed access, governing the formation of group of farmers determine the effectiveness of a collective approach*
Evaluation method	○ *Theoretical approach*
Indicators of effectiveness	○ *Club size = number of participating farms*
Effectiveness	○ *For the study on collective reservoirs for improved water availability, it can be seen that here that managing the formation of the group of farmers in a sort of open list (open access) is more cost effective in reaching a determined groundwater use level than in a closed membership setting. Nevertheless the advantage of a closed access policy scheme could be lower transaction costs, which should be investigated for a final recommendation.*
Transferability	○ *Water availability is inherently complex due to its connections throughout the system, most strongly to climate and weather, which means that governance mechanisms only have limited ability to improve this PGB. The mechanism itself however has little complexity and a direct relationship to water availability, as payments are made directly to enable rainwater harvesting. As a governance mechanism the RDP is well established across the EU, and therefore is able to work within existing institutions, promoting incremental scale change. Both opportunity costs for providers and transaction costs are low. Overall the simple nature of the problem and direct and simple governance mechanism means that financial support for water collection within the RDP is likely to be easily transferred*
Policy recommenda-tions	○ *The theoretical analysis shows the importance of the type of access and membership to the club for the design of the policy mechanism. A simple linear subsidy is sufficient to affect the reservoir size in case of open membership. However, this type of payment is ineffective in case of closed membership. In case of closed membership, minimum participation rules that explicitly link the subsidy to a desired n-size of the club are required.* ○ *The analysis suggests how the open access case seems to be more cost effective than a closed access one. However, here we do not take into account the administrative transaction costs. If we interpret the open access case as a sort of open list, relatively more effort from the administration is required than in the case of closed access, where farmers are fully in charge of the management of the group formation* ○ *The need to coordinate entry rules and payment, hints at the important role of coordination between the CAP, water policy objectives and other local rules that can affect entry. While it seems that an open membership would entail lower cost to reach the societal goals, a proper comparison would require the assessment of the administrative transaction costs in the two cases.* ○ *It would be interesting to re-consider the limitations imposed by the EU. For example, w.r.t. the minimum threshold in the regional case of the basin which had to be mandatorily set, otherwise they could not have been able to present the basin as an infrastructure. They suggested that a discussion among the participants of the basin (taking into account local costs structure and environmental priorities) of the aforementioned minimum threshold, rather than imposing it ex ante by the EU, could be a good solution in order to re-negotiate the policy (also towards a collective approach)*

3.1.6 Agglomeration bonus vs. traditional AES

CSR context	○ *IT-3: Improving biodiversity/pollination in the hilly and mountain area of the Ravenna province in Italy*
Description	○ *A traditional, individual-targeting agri-environmental scheme is compared with a collective agri-environmetal scheme in the form of an agglomeration bonus.*
Evaluation method	○ *Land allocation model within a game theoretic framework*
Indicators of effectiveness	○ *Allocation of land use types (area in ha)*
Effectiveness	○ *Any payment increases the land allocated to public goods. However, with increasing payment levels, for AES the size of the coalition remains the same. In contrast, under the conditions of the agglomeration bonus, the size of the coalition increases. Under the condition of the highest payment levels, in an agglomeration bonus scheme the whole farmers' community takes part. It is to note that big farms enter earlier, also under the condition of lower payments.* ○
Transferability	○ *AES to improve pollination should be highly transferable, though account must be taken of the high number of external interacting factors which also influence pollination.*
Policy recommenda-tions	○ *Results show that while cooperation on the management of an ecosystem service would be an efficient choice that is however constrained by the classic free-riding issue.* ○ *Properly designed mechanisms, in this context, not only increase the rate of land allocated to conservation, but also stabilize larger coalitions that would not emerge otherwise. Under the conditions assumed in the model (biodiversity provide an ecosystem service, no transaction costs, etc.), targeting coalitions with dedicated AES seem to be more effective than the traditional individual based AES.* ○ *The main policy recommendation is thus to increase the difference between traditional, individual payment, and the collective bonus.* ○ *Further studies should account for transaction costs, spatially explicit issues and different ecosystem services.*

3.1.7 Rural development programs

CSR context	○ *IT-1: Improving soil erosion, rural vitality and carbon sequestration in the hilly and mountain area of the Bologna province in Italy*
Description	○ *Existing RDP in Emilia Romagna; measure 13.1.01 that provides a payment for farms located in mountain areas with the payment set at 125 ha-1y-1.*
Evaluation method	○ *Land allocation mathematical model*
Indicators of effectiveness	○ *Allocation of land use types (area in ha)*
Effectiveness	○ *The results show, that without any policy but under the consideration of the 3 public goods in creating social welfare, land use would shift from agricultural production to an increase of forested area and a decrease of agricultural area, as in forest area the public goods of carbon sequestration is provided. In the scenario of the social optimum, where all 3 PGs are provided, a major shift towards forest area becomes obvious, while abandoned land decreases strongly and also arable land decreases to a large extent.* ○ *Under the condition of the RDP, private profits of farmers take a larger part in the total social welfare. This results in changes of land use, which lead to an increase of rural vitality and a slight enhancement of the PG soil erosion, but a clear decrease in carbon sequestration. In sum, the decrease of carbon sequestration is so strong that it cannot be balanced by the enhancement of soil erosion and rural vitality, so utility and total social welfare decreases by the introduction of the RDP.*
Transferability	○ *RDP payments are a central part of agricultural policy across the EU, and therefore well-established within institutions. As a mechanism these payments are also simple because they are made only for maintaining agriculture, not based on outputs. Scale of change is small, as changes are added to the RDP, and restricted to a well-defined geographical area.* ○ *Few side effects will be associated with this mechanism, and because payments are to maintain action rather than change action opportunity and transaction costs will also be low.* ○ *The inclusion of rural vitality as a goal from increased RDP payments for mountain farms reduces the transferability of this mechanism, due to the increased complexity within the problem, and less direct relationship to the solution. However, the mechanisms for carbon sequestration and soil erosion are likely readily transferable, as long as consideration is taken to account for the removal of rural vitality as a goal.*
Policy recommenda-tions	○ *Since, despite its reversible character, land use changes entail costs, agri-environmental policy should have a relatively large time horizon and have a comprehensive assessment of the PG provision they entail.* ○ *Moreover a careful analysis of public good values and demands seems to be necessary, when decisions, such as major land use changes, are partially or difficultly reversible, and society might be locked-in in negative situations.* ○ *Especially incentives towards e.g. forest might assume an option value approach. This is also in lights of the volatile societal preferences for public good and the limitations that any WTP valuation assessment involves.*

3.1.8 Landscape function optimisation for improving nature management plans (NBP)

CSR context	○ *NL-1: Habitat, biodiversity, aesthetic quality and agricultural production in the "Kromme Rijn" area, the Netherlands*
Description	○ *Landscape function optimization* ○ *Balancing multiple environmental objectives/ functions while minimizing trade-offs between those functions* ○ *Including the influence of different agri-environment measures* ○ *Comparing optimization results to current nature management plan (NBP)*
Evaluation method	○ *Landscape optimization model (multi-objective optimization algorithm)*
Indicators of effectiveness	○ *Allocation of land use and land use management (maps)* ○ *Increases in landscape functions (%)*
Effectiveness	○ *When adding additional PG targets into the management plan and optimizing land use under the consideration of trade-off targets, the areas addressed in the original plan clearly differ from those proposed by the optimised management plan. The results show that a land allocation different from the one envisioned in the nature plan would not only induce a smaller loss in pasture production, but also boost the other three environmental objectives. This means that a combination of on-farm and off-farm measures compared to the nature plan has the double advantage of limiting the loss of pasture production and increasing the habitat for the target species, while also orchard production and landscape aesthetics can be stimulated*
Main strengths	○ *Clear regulations* ○ *Effective nature protection*
Main weaknesses	○ *Bad communications* ○ *Wrong governmental level*
Enabling factors	○ *Communication* ○ *Expansion of options*
Barriers for uptake	○ *Lack of flexibility* ○ *Lack of continuity*
Transferability	○ *The wide range of mechanisms and goals contained within the Dutch Nature Management Plan, with its inherent complexity, greatly reduces the transferability of this governance mechanisms, despite building on existing mechanisms and institutions.*
Policy recommenda-tions	○ *Current nature management plan may be strengthened by simultaneously considering additional environmental objectives when allocating off-farm and on-farm measures.* ○ *Results can be used as a discussion tool with local stakeholders to conjointly develop an improved NBP that can meet more environmental objectives an also reduce costs for farmers.More importantly, these results can be used as a discussion tool with local stakeholders to conjointly develop an improved NBP that can meet more environmental objectives an also reduce costs for farmers.*

3.1.9 Decentralisation of policy and payments for ecosystem services (PES)

CSR context	○ *FR-1: Water purification, habitat, flood prevention and climate stability in the Odet Watershed in Brittany in France by wetlands threatened by land abandonment by agriculture.*
Description	○ *Optimal level of decentralization of financial incentives, payments for ecosystem services or classical agri-environmental schemes*
Evaluation method	○ *Mathematical modelling*
Indicators of effectiveness	○ *Wetland area maintained (ha)*
Effectiveness	○ *The study finds large gains from the agricultural management of wetlands, PES being the best governance mechanism to capture them. In PES, central government should pay for global PG while local consumers, including local governments, should pay for local PGs. There is a large bargaining room between consumers' representatives (public authorities, anglers' associations, firms) and the suppliers of local PGs (landowners and farmers).* ○ *Decentralization of governance is a good alternative to PES. This result is due to the crucial assumption that local governments have access to better information of the heterogeneity of local PG values but also because global PGs values are lower than local PGs., leading to relatively small externalities.*
Main strengths	○ *PES: no budget limits* ○ *PES: Adaptation to local and particular situations* ○ *Negotiation freedom*
Main weaknesses	○ *Lack of information on willingness to pay* ○ *Transaction costs associated to contract design* ○ *Risk sharing associated to contract design*
Enabling factors	○ *More and more experiences accompanied and monitored by researchers and supported by government agencies* ○ *Potential to cumulate payments for different (jointly produced) PGBs* ○ *Several ongoing works on the jurisdiction aspect of PES*
Barriers for uptake	○ *Lack of genericity of successful experiences* ○ *Lack of legal references to design PES contracts (which are not agricultural support to be notified to the European commission* ○ *Difficulties to prove the additionality of the various PES*
Transferability	○ *The simplicity of the mechanism and relationship to the PGB means that PES to prevent land abandonment are likely to be transferable. However careful consideration of the drivers of land abandonment at a given location needs to be taken.*
Policy recommenda-tions	○ *The effectiveness of decentralization depends mainly on the distribution of local and global public good values across the territory. The case of wetlands is rather common in the sense that local public good values are higher and more heterogeneous over space than global public good values. In this case, the decentralization is recommended, as local governments know better the demand for local public good. In the case where local public good demand is low compared to global public good one (and/or local public good values present low dispersion across space), centralization should be privileged because central governments internalize the effects of global public good provision on other regions.* ○ *To go further than the modelling results, decentralization gives the opportunity to raise additional funds, e.g. based on cost savings in the production of drinkable water.* ○ *More generally, with negligible transaction costs, the best policy mix includes one instrument for each global public good (e.g. payment for net carbon sequestration, payment according to biodiversity indicator) and one instrument for each local public good (e.g. payment for nitrate abatement, payment to maintain angling resources).* ○ *We find that decentralization is a good alternative to PES. This result is due to the crucial assumption that local governments have access to better information of the heterogeneity of local PG values but also because global PGs values are lower than local PGs, leading to relatively small externalities.*

3.2 MECHANISMS MIXES WITH STRONG FOCUS ON FINANCIAL INCENTIVES

3.2.1 Mix of mechanisms for improving natural landscape quality

CSR context	○ *RO-1: Improving natural landscape quality in the Dorna valley in North East Romania*	
Description	○ *A mix of mechanisms consisting of targeted AES and education/information measures*	
Evaluation method	○ *Multiple objective linear programming model*	
Indicators of effectiveness	○ *Benefits for farms and from public good provision*	
Effectiveness	○ *The implementation of agri-environmental schemes has a direct and noticeable impact on the real benefits obtained by the farmers. All cases show that, after adopting public good oriented production methods, the immediate financial benefits decrease. The market conditions can influence the performance of the governance mechanisms taken into consideration. For small farms, the propensity to apply traditional practices on their own pastures exists from the beginning. This means that, even in the absence of agri-environmental payments, some amount of area is natural. For medium and large sized farms the behaviour is different, as under the condition of AES land use can also shift to more intensive forms on some area to compensate forage losses.*	
Main strengths and enabling factors	○ *Profitability* ○ *Experience* ○ *Degree of devotion*	○ *Agarian policy* ○ *Natural conditions* ○ *Increasing demand for organic products*
Main weaknesses and barriers for uptake	○ *Awareness and information* ○ *Level of habits related to farm practises* ○ *Farmers age*	○ *Climate change* ○ *Bureaucracy*
Transferability	○ *Overall AES and education and consultancy from improving natural landscape are likely to be transferable across the EU, though care must be taken to account for subjectivity of natural landscape improvements overall.*	
Policy recommenda-tions	○ *The implementation of a mechanism mix – combining AES and information-education - could solve the problem of conservation and improved provision of public goods. Generally, this „cocktail" mechanism must be supplemented by general policies such as research and education, free market orientation, or development policies for poor regions.* ○ *Considering the wide range of beneficiaries in terms of size, the policies could be adapted to different size classes, in order to respond better to their specific problems.* ○ *Because the input and output prices could influence the decision of adopting a public goods orientation in the agricultural activity, the policies (especially those affecting small farms) have to consider some form of financial support for the cases in which the price volatility or the price spread is very high as a result of the dimension of the farms. These kinds of measures could diminish the sensitivity of the decisions related to the provision of public goods/decreasing of public bads.* ○ *Related to the education/information/consultancy measures, we appreciate the necessity of a wide cooperation between different actors (state agencies, education institutions, NGO, consultancy firms) in terms of a common strategy to disseminate the adequate and homogenous information and knowledge. The goal of this strategy would be to create a new outlook of the results of the agricultural activities, seeking not only the generation of profits, but also of public welfare.* ○ *To be more efficient, the mechanisms must be implemented without an augmentation of the bureaucracy. The formalities must be clear and easy to apply, considering mainly the advanced age of the beneficiaries from the rural side of Romania.* ○ *Finally, whatever the instruments used to produce public goods will be, the policies must be stable in the long term to assure the beneficiaries that their efforts will be rewarded also over time, regardless of the orientation of the government.*	

3.2.2 Mix of mechanisms for improving water quality, food security and scenery and recreation

CSR context	○ *BG-1: Improving water quality, food security and scenery and recreation in the Bulgarian South central planning region*
Description	○ *A mix of mechanisms consisting of collective action, AES and quality product certification*
Evaluation method	○ *Quantitative model integrating a modified partial equilibrium model between demand and supply of public goods based on the economic model of the gross margin and the results of the principal components method (PCM)*
Indicators of effectiveness	○ *Levels of supply of public goods*
Effectiveness	○ *Sufficient levels of PG provision for water quality and food security are only achieved, if the subsidies are set to the maximum. E.g. for water quality, the sole payment even of high subsidies under the nitrate directive is insufficient. Only under the precondition of an additional subsidy for LFA, the level of supply equals the level of PG demand. For the PG scenery and recreation, particularly the inclusion of support for investments in improving environmental infrastructure leads to provision levels, which equal or even slightly exceed the demand levels.*
Main strengths and enabling factors	○ *Cost effective* ○ *Easy to verify, monitor, inclusive* ○ *Synergies with other policy goals* ○ *Demand for healthy local food*
Main weaknesses and barriers for uptake	○ *Does not take local conditions into account* ○ *Lack of access to credit and information* ○ *Unstable regulation which change often* ○ *Trade-offs with other goals* ○ *Climate change*
Transferability	○ *The mixture of mechanisms suggested would be expected to be largely transferable thanks to being based on existing mechanisms, and directly connected to the PGBs. Care must be taken to account for the subjective nature of scenery and recreation, as well as the challenges this presents to predicting outputs.*
Policy recommenda-tions	○ *Measures to promote supply and align it with the demand level should be applied in a comprehensive manner. Each of them, if applied separately, would not produce the desired result. In addition, the amount of subsidies received should be the maximum allowable amount provided for under the relevant measures. Only in these circumstances a balance between the level of demand and the level of supply of public goods be can reached.* ○ *The barriers for an implementation of the governance mechanisms can be overcome by using the cluster approach. It will improve understanding of GM and their application.* ○ *Involvement of stakeholders would be appropriate to achieve proper economic outcomes for participants, as well as to realize the second-order effects with the non-economic nature of local society.*

3.3 MECHANISMS MIXES

3.3.1 Mix of mechanisms for water quality and biodiversity

CSR context	○ *UK-1: Improving water quality and biodiversity in the "Ugie river" catchment in Scotland*
Description	○ *A mix of mechanisms consisting of reformed agricultural payments (agri-environmental schemes, land-based subsidies), Market mechanisms (e.g. PES), Taxes, Regulation, Public opinion (changed narratives, branding/ labelling, awareness), Change in supply-chains (shortening chains, provide alternatives, inputs as well as outputs), and Collaborative approaches (e.g. catchment partnerships).*
Evaluation method	○ *Fuzzy cognitive mapping*
Indicators of effectiveness	○ *Expert scores (including farmers and academics)*
Effectiveness	○ *As long as the mix of mechanisms is part of the system, no large changes occur if the impact of the mechanisms is strengthened or set to the maximum. In contrast, if mechanisms are clearly weakened or taken out of the system, the changes in the system are big. Main effects become obvious in relation to agricultural practices, which are the precondition to public good provision. As regards the impacts of individual mechanisms in the mechanisms mixes, only in some cases PG provision is driven by a single mechanism in the mix (e.g. 2nd Pillar for biodiversity in the stakeholder model). Normally, effects are related to the whole mix of mechanisms. Particularly if a bundle of PGs is considered, the mix of mechanism is the most stable way to safeguard their provision.*
Main strengths	○ *Can promote specific outcomes/targets* ○ *Can set common standard* ○ *Enforceable*
Main weaknesses	○ *Political will impacts implementation* ○ *Different actors have different priorities* ○ *Not targeted*
Enabling factors	○ *Can impact wider areas* ○ *Brexit – EU not an excuse anymore* ○ *Can influence land ownership*
Barriers for uptake	○ *Poor financial robustness of the agricultural sector* ○ *Can have detrimental effects on environment* ○ *Disconnect between payment and delivery*
Transferability	○ *The complex nature of the problem of water quality and biodiversity, the wide variety of mechanisms included in the UK governance mixture, and high opportunity and transaction costs means that these mechanisms have limited transferability.*
Policy recommenda-tions	○ *An orchestrated mixture of mechanisms is recommendable to improve the complex issues of biodiversity and water quality* ○ *It is important to ensure that mechanisms are not dropped in favour of new subsidies, for example, as decline is then likely.* ○ *Regulation alongside incentives were identified as important, with stakeholders particularly noting that regulation in Scotland is often seen more as a 'suggestion', so enforcement was an important part of good regulation.* ○ *Overall stakeholders identified the need for mechanisms to be targeted to the local area to have any significant difference, and suggested that mechanisms which don't allow for local adaptation will not be enacted.* ○ *Though not originally included within the governance mechanism mixture technological change was added by the stakeholders, and considered to have the largest impacts. Improving enforcement of regulation, or increasing regulation, was also identified.*

3.3.2 Mix of mechanisms for soil functionality, water quality and habitats and biodiversity

CSR context	○ *AT-1: Improving soil functionality, landscape quality and water quality in the intensive arable region "Marchfeld" in East Austria*
Description	○ *A mix of mechanisms consisting of collective bonus, sales guarantee and performance oriented payment for environmental services (PES) by private sector, local collective partnership, marketing & labelling, awareness building*
Evaluation method	○ *Fuzzy cognitive mapping*
Indicators of effectiveness	○ *Expert scores*
Effectiveness	○ *Improved private or public, collective or performance-oriented monetary incentives can be central tools for addressing the environmental impacts of agriculture. Monetary incentives are considered the keystone as they feature a number of connections in the system between mechanisms and public good provision. But ancillary factors, like enhanced collaboration between farmers or enhanced awareness building are important catalysts for an effective agri-environmental governance. Also aspects related to farmers´ attitude and socio-economic scenario are central.*
Main strengths	○ *Positive image of incentive due to "bonus" character and supportive measures* ○ *Relaxing he trade-off between economic and environmental performance.*
Main weaknesses	○ *Local labels can get lost in the shuffle of existing labels* ○ *Farmers don't want to feel dependent on the management requirements of a food chain company, especially as company requirements might change quickly and compensation is not guaranteed in the long run* ○ *Lower payments in the starting phase of collective payments* ○ *Farmers who are not willing to work collectively are not considered*
Enabling factors	○ *Close proximity to growing urban areas/regional brands* ○ ***Already existing networks can be used and will be fostered*** ○ *Demand for healthy food*
Barriers for uptake	○ *Climate change and dry conditions might prevent agricultural production* ○ *Price competition generates "raise to the bottom" and prevent "expensive" management* ○ *Farmers' negative attitude toward the food chain*
Transferability	○ *Considering transfer of the Austrian mix of governance mechanisms it is important to take account of the complexities of the PGBs considered, as well as the complex relationship with the mechanisms suggested. Collaborative partnerships and collective bonuses add complexity to the mixture, while output based payments increase transaction costs. As such the transferability of such a mixture is likely to be low*
Policy recommenda-tions	○ *A range of driving factors determine the success or the failure of a public good governance mechanism. For instance, the importance of farmers' motivation (directly related to adoption costs) may appear obvious, but its connection with farmers' ability is less trivial and suggests to reflect with more trust on the potential behaviour changes linked with boundary management through communication, translation, and mediation.* ○ *A smart and cost-effective governance of public goods can be achieved if the whole socioeconomic context is able to support and integrate with the agro-environmental objectives.* ○ *Therefore, the discussion around governance should focus on a range of tools including monetary incentives together with more ancillary factors able to affect "soft" aspects such as awareness, rural vitality, and social pressure.* ○ *As a general perspective, agriculture policy objectives such as innovation and efficiency should not generate contrasts with these "soft" aspects and the target of public goods delivery.*

3.3.3 Mix of mechanisms for climate stability, water quantity and biodiversity

CSR context	○ *DE-1: Improving climate stability, water quantity and biodiversity in peatland areas in Brandenburg in Germany*
Description	○ *A mix of mechanisms consisting of agri-environmental schemes, farm coordination opportunities & value chain opportunities through market innovations*
Evaluation method	○ *mixed method approach, consisting of a discrete choice experiment, scenario and impact assessment, and a literature study*
Indicators of effectiveness	○ *Willingness to accept (€/ha*a)* ○ *Carbon emission (t CO2 äquiv)*
Effectiveness	○ *The overall willingness to accept the AES under the current contract conditions is clearly higher than the compensation payment offered. With the add-on of support for cooperation and value chain opportunities for the grass cut on rewetted area, the WTA decreases to an extent, which is in the range of the compensation payment of the current AES measure.*
Main strengths	○ *Voluntariness* ○ *Novelty: measure specifically addressing peatland issue* ○ *Guaranteed payments for farmers*
Main weaknesses	○ *Missing knowledge and advisory services in the mix* ○ *Missing spatial targeting (e.g. ecological functional units)* ○ *Ecological impact monitoring missing, ecological impact not guaranteed*
Enabling factors	○ *Open discourse and dialogue (science, practice, politics relevance gain, awareness raising)* ○ *Neighborhood involvement in cooperation and social capital* ○ *Utilization of unproductive areas*
Barriers for uptake	○ *Uncertainty (short funding period, required long term funding not incentivized)* ○ *Degree of productive capacity of land declines* ○ *High coordination efforts*
Transferability	○ *The inclusion of value chain opportunities through market innovation reduces the transferability of the German mix of governance mechanisms due to its novelty, indirect, complex, or untested, links to change, and the large scale over which it could act. Both AES and farmer cooperation could alone be highly transferable but would need to account for the potential that outcomes would be reduced without the inclusion of market innovation.*
Policy recommenda-tions	○ *The AES targeted at peatland areas is an effective policy instrument to enhance the provision of public goods through adapted land management.* ○ *However, by taking into account the perceived private transaction costs and tailoring the contract design, the potential provision could be largely increased.* ○ *To maximize the provision potential we recommend a governance mix of: 1) financial incentive, such as the AES, 2) support for cooperation among neighbouring land managers and 3) incorporation of regional value chain approaches, e.g. through valorisation of residual material in an innovative heating system.* ○ *To reconcile this mix of these three governance mechanisms a regional facilitator and an overarching strategy would be beneficial.* ○ *With the suggested governance mix the provisions of several public goods (climate stability, biodiversity, water quantity) could be increased*

3.4 COLLECTIVE APPROACHES

3.4.1 Collective action based on LAG for water availability

CSR context	○ *CZ-1: Improving water availability in Northern Bohemia in Czech Republic*	
Description	○ *Integration of a LEADER LAG into a collective action. Specifically, the collective action aims at fostering agro-technical practices and technical measures (barriers, polders, ponds)*	
Evaluation method	○ *Qualitative mixed method approach consisting of reviewing the 8 OSTROMS principles, Fuzzy cognitive mapping and impact assessment using MAPP*	
Indicators of effectiveness	○ *Qualitative description of effectiveness*	
Effectiveness	○ *Particularly internal rules to be developed and obeyed, are a challenge. A major obstacle is the negotiation of technical measures on private lands for the sake of common interest. In the case of operational measures, all members need to commit themselves to maintain the technical measures. Correct behaviour needs to be encoded in the internal rules, and sanc-tions for not complying need to be formulated consequently. It is crucial that the collective succeeds to create individual responsibilities of members in this respect. Scenario analysis shows that the LAG based collective action can improve the provision of water availability in a robust way, i.e. it will help to cope with climate change and CAP changes. An essential condition for robustness lies in achieving members' commitment for management of water retention. An essential attribute of the proposed LAG based collective action is that the costs of maintaining the water retention facilities are distributed fairly among the members of the LAG. However, the experts are sceptical on this and therefore this attribute actually played a minor role in the effects of scenarios.*	
Main strengths & Enabling factors	○ *High share of grassland* ○ *High interest in problem solving* ○ *Existence and capacity of platform (LAG)* ○ *Fostering cooperation with research through operational groups (programme of rural development)*	○ *Regional Landscape Study* ○ *Farmers will gain understanding of the Ministry of Environment for the use of TM better funding opportunity* ○ *Funding opportunity for TM through Land Consolidation Programme*
Main weaknesses & Barriers for uptake	○ *Self-government inaction (passivity)* ○ *Self-governance conception and strategy missing* ○ *Lack of information/ Lack of interest* ○ *Misunderstanding about the use of technical measures*	○ *New CAP will stimulate intensity (Supports conditioned by higher livestock intensity)* ○ *Deterioration of climatic conditions* ○ *T7 Contradicting policy objectives (Ministry of Agriculture x Ministry of Environment)*
Transfer-ability	○ *Transferability of technology to improve water availability is high, as this mechanism is directly related to the PGB, has a single goal, generally low costs and is simple to apply. Consideration of the local climate and weather conditions will be needed to ensure success in transfer. Transferability of collective action is more complicated: it depends on the capacity of actors to unify for their own interest. It seems that use of existing collective platform as LAG LEADER might be a good way.*	
Policy recommenda-tions	○ *The critical issue of improving retention capacity of landscape is coordination, while support programmes are available. Either a public body is authorised and effectively providing it, or it is in the interest of local people to establish a self-governance. Not only that such a public body is absent in the hot spot area, there is only little emphasis on governance in the government strategy for mitigation of climate change induced drought. The LEADER LAG can be a platform for a water retention self-governing action. It is critical that such a role of LAG is recognised by all relevant public authorities. An improvement in either of these directions is essential for the enhancement of water retention of landscape not only in the CSR. In addition, the narrow perception on the function of retention ponds preventing their utilisation in agriculture and fishery should be given-up, since it reduces the benefit of retained water and thus discourages actors to build them. Overuse of the ponds can be limited in agreements with the respective coordination bodies (public or collective). If sufficient commitment of most members of the collective action is not achievable, the public authority based coordination is preferable.*	

3.4.2 Fostering broader stakeholder integration

CSR context	○ *CZ-2: Improving recreation services and biodiversity of forest lands in the National Geopark Ralsko in Northern Bohemia*	
Description	○ *Branded fundraising and a broader integration of local stakeholders into an already existing Geopark*	
Evaluation method	○ *Qualitative mixed method approach*	
Indicators of effectiveness	○ *Qualitative description of effectiveness*	
Effectiveness	○ *Benefits are likely, if the efforts of the already existing Geopark management are linked with a broader set of stakeholders. Reconnecting the "elite based" management of the Geopark with people and small and medium size businesses amends the original organization with an essence of community based organization (while maintain its operability). Adding other ways of funding improves financial stability of the Geopark for its development and maintenance: Institutional funding provides secure finances and will enable broadening activities. Obtaining financial resources by branded fundraising might be slow and the expected funds small, nevertheless the need to approach donors might go hand by hand with the "reconnection" effort..*	
Main strengths & Enabling factors	○ *High share of grassland* ○ *High interest in problem solving* ○ *Existence and capacity of platform (LAG)* ○ *Fostering cooperation with research through operational groups (programme of rural development)*	○ *Regional Landscape Study* ○ *Farmers will gain understanding of the Ministry of Environment for the use of TM better funding opportunity* ○ *Funding opportunity for TM through Land Consolidation Programme*
Main weaknesses & Barriers for uptake	○ *Self-government inaction (passivity)* ○ *Self-governance conception and strategy missing* ○ *Lack of information/ Lack of interest* ○ *Misunderstanding about the use of technical measures* ○ *New CAP will stimulate intensity (Supports conditioned by higher livestock intensity)* ○ *Deterioration of climatic conditions* ○ *T7 Contradicting policy objectives (Ministry of Agriculture x Ministry of Environment)*	
Transferability	○ *Opportunity costs of establishing a Geopark will be substantial, as restrictions to forestry and changes to land use are perceived to be extensive by current land owners. Transaction costs are also high, as a result of the large number of actors, industries and potential side effects. These high costs combined with the large spatial scales and high complexity means that the Geopark model will be hard to transfer. This is at odds with the fact that Geoparks are an internationally transferred mechanism but reflects the need to account for local conditions when looking for policy transfer.*	
Policy recommend-ations	○ *It is important to keep in mind that the "elite" initiated the Geopark as a mean for rural animation because the local community had not a sufficient capacity to do it. Looking for a framework with promising governmental back-up was pragmatic; it was deemed it would lead to coordinated activities of main stakeholders, enable public funding as well as encourage private investment. In areas with low population density, wiped traditions due to dramatic demographic changes, depressed industry and high share of socially excluded people the benefits of institutional implants like the Geopark are postponed while a lot of funds are needed to develop the activities and to improve infrastructure. An earlier involvement of other stakeholders from local communities and businesses would create pressure on collaboration of the key stakeholders. However, it would not affect funding too much. Our policy recommendation is to offer a programme based on public-private partnership providing funds to finance necessary administration, development of strategies and some "animation" activities for the period of five or more years. Something very similar to LEADER LAG, but tailored to specific territories. Actually, such a programme can be integrated in LEADER, particularly if the corresponding LAGs involving the territories in question exist.*	

4 CONCLUSIONS

Deliverable D5.4 of the EU H2020 project PROVIDE reported on the lessons learned from the participatory development and choice of appropriate governance strategies and mechanisms for the improvement of public good provision in European agricultural and forestry areas. On the one hand, based on the experiences of the co-design process, D5.4 gave guidance on how interaction with stakeholders, as a part of an evidence based process of mechanisms development, can be implemented. On the other hand, it provided lessons learned from the main results of this process, particularly considering the main pathways of optimising and improving governance mechanisms for public good provision.

The case study approach of governance mechanisms design followed in PROVIDE highlighted the complexity around governance-making for public good provision, with many factors interplaying, at different temporal and spatial scales (e.g. biophysical, socio-economic, context-specific factors). It showed that insufficient public good provision is an issue in all regions that have been taken into account in PROVIDE. It became clear that these issues exist despite the variety of governance mechanisms that have been available under the framework of the CAP since a long time. The broad variety of examples of failures and mismatches of the current agri-environmental policy approaches, detected on local level in the governance design process, reveal that a revision of the current governance system for public good provision from European agricultural and forestry systems is necessary.

Particularly biodiversity and habitats, water quality and quantity, and the ability of the agricultural and forestry systems to mitigate emissions and to adapt to climate change are not provided in sufficient levels throughout many regions. Moreover, the public goods scenery and recreation as well as rural vitality are an issue recognised in some regions. As regards PG issues, they are not distinctively linked to the agricultural or forestry land use systems, and similar PG issues can occur in entirely different land use contexts. However, it becomes obvious that in intensive regions and in regions faced by land abandonment, a broader variety of particularly environmental public goods are perceived to be at risk, while in extensive agricultural regions and in forestry regions mainly the balance between demand and supply of social public goods, such as rural vitality and scenery and recreation, is perceived to be insufficient. On governance design this difference has an impact: governance strategies in

intensive land-use systems particularly have to take account of the complex interlinkages between the different environmental public goods in need of improvement, as well as of the often strong trade-offs between the objectives of agricultural production and the measures necessary to improve the provision of environmental public goods. From the results of the development of mechanism in PROVIDE, it can be concluded that the requirements to install successful governance mechanism in intensive regions are big: good financial incentives, such as PES, or collective incentives, encouraging farmers' self-responsibility and regarding public good provision rather as a product or results, which is payed for (in contrast to compensating costs) seem necessary. Moreover, the interplay of mutually supporting mechanisms should be considered and financial incentives should be combined with supporting mechanisms such as fostered horizontal and vertical collaboration, information and awareness-building. The consideration of opportunities along the agro-food chain seems crucial, in particular as markets and prices for agricultural products strongly affect the profitability of public goods production, and production requirements set by agro-food companies can have significant impacts on agricultural management. In contrast, in regions, where the pressure of agricultural production on environmental public goods is lower, targeted stand-alone mechanism might already be successful. Particularly where social public goods are demanded, which can be directly consumed by e.g. the local society or tourism, smart private approaches, such as the private PES scheme developed in the Finnish CSR, are an option.

From the process of participatory co-design for mechanisms development in PROVIDE it can be concluded that the involvement of stakeholders in the governance-making process has major advantages: First and foremost, the knowledge that can be gathered through stakeholder expertise on local level is remarkable. Particularly knowledge on what issues are at stake at local level, which mechanisms could be suitable for solving the PG issues and for which reasons, which existing governance structures and existing networks could be used as carriers for mechanisms' implementation, which future regional developments are probable, which target levels of public good provision are realistic due to the socio-economic and natural basis conditions and their development, and which locally relevant factors and barriers impact on applicability, acceptance and finally effectiveness of the mechanisms, represent most valuable inputs for governance design. Nevertheless, the experiences from PROVIDE also reveal that the process of participatory mechanisms design needs scientific support and the results need cautious verification, as agenda setting, overruling or lacks of knowledge during

mechanisms design are potential components of a participatory approach that need to be taken into account.

Policy mechanism design should be linked to appropriate tools of decision support. On the one hand it was shown that particularly mapping, spatial analysis and land function optimization approaches can significantly improve spatial targeting of mechanisms and management measures. Impressively this was shown in the case of forest protection in Finland and Estonia and in the land function optimisation exercise in the Netherlands. On the other hand it became clear that the assessment of information on the benefits and costs associated with PGs provision needs to be part of the development of governance mechanisms. The development and broader application of suitable and reliable valuation methods is crucial, as particularly for the setting of realistic target levels of public good provision knowledge about costs and benefits of PG provision is indispensable.

During the evaluation of the governance mechanisms it became clear that the development of suitable indicators to value public good provision is challenging. However, good indicators are essential not only for valuation but also for monitoring the effectiveness of the mechanism and to reflect the compliance of the different policy-relevant criteria. Particularly for the provision of global public goods, indicators need to be developed which are directly comparable and enable the choice of the most effective and cost-efficient strategies (e.g. using CO_2 abatement cost in order to value emission mitigation immediately shows the competitiveness of different approaches of emission mitigation). Contrastingly, for distinctively local public goods such as biodiversity, very context-specific, local indicators are needed, specifically taking into account and monitoring the species and habitats characterizing the region.

Overall, as regards the optimisation pathways for governance mechanism for improved public good provision, from the results of PROVIDE it can be concluded that better targeting of financial incentives, the consideration of mutually supporting mechanisms in mechanisms mixes, as well as the support of collective approaches represent potential entry points for improved governance strategies. Following these different pathways, for a successful improvement of pubic good provision in the European agricultural and forestry regions, in any case it will be crucial to ensure consistency between different private and public mechanism in the governance systems and mechanisms mixes in place. Orchestrated mixes of

mechanisms are needed to avoid trade-offs between mechanisms and the provision of different public goods and to create a balanced and parallel production of private and public goods. This also holds for the orchestration of the Common Agricultural Policy, particularly in the interplay between the measures of the 1. Pillar, mainly aiming at the support of farm income and the competitiveness of agricultural production, and the agri-environmental objectives of the 2. Pillar.

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