The James Hutton Institute

Governance and policy analysis in relation to the Aberdeenshire Regional Land Use Pilot

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The analysis aims to inform the implementation of the Regional Land-use Pilot (RLUP) of Scotland's Land Use Strategy (LUS) in Aberdeenshire. This work aims to explore how well the existing policy objectives are likely to fit with the LUS and the underlying principles, which builds on the Convention for Biological Diversity's Ecosystem Approach. As such, it therefore aims to identify the institutional and governance-related barriers to aligning the Land Use Strategy with an Ecosystem Approach. To assess how well these objectives correlate, and how stakeholders could contribute to the delivery of the RLUP and the Ecosystem Approach we carried out a thematic policy analysis and stakeholder analysis. These are represented in matrices and grids identifying links and interactions (conflicting and complementary) between the delivery of ecosystem services, different policy instruments, and different stakeholder groups.

Policies could be grouped into four different categories, in terms of their relation to the RLUP: (1) directly supportive of the delivery of ecosystem services, (2) indirectly supportive, (3) ambiguous, and (4) very indirect or neutral. These four types reflect two different levels of interactions between policies and the natural environment with one level reflecting strong connections and more direct impacts on the delivery of ecosystem services and another level reflecting more indirect influence on ecosystem services. Both levels should be considered by the RLUP in order to be fully inclusive of all the existing policies. However, for the first phase of the project, Aberdeenshire Council should focus on more operational documents which directly target ecosystem services. The policies analysed here were those listed as relevant for the Regional Land Use Pilots by Scottish Government. However, other policies are also likely to influence the delivery of ecosystem services and should therefore also be taken into account by Aberdeenshire Council. Examples are the Common Agricultural Policy and the Scottish Rural Development Plan which are keystone policies on rural development.

For the analysis of stakeholders, these were placed in four different categories according to their potential to influence or be influenced by ecosystem services and the implementation of the RLUP. Land owners appear to constitute key players for the delivery of ecosystem services and the implementation of the RLUP as they have a high potential to influence the delivery of ecosystem services and also a high potential to be affected by changes in ecosystem services delivery. Their involvement is therefore crucial and public organisations should seek to engage with them and find efficient ways to work with them. The study also emphasises the need to take into account and empower local communities as they are strongly affected by the delivery of ecosystem services and by the RLUP.

It appears that all the components analysed here are well correlated in terms of their aims and that existing policies can contribute to the delivery of the LUS objectives and the implementation of an Ecosystem Approach. However, some conflicts may arise in the process of policy implementation at the local level even for policies whose objectives are synergistic with the LUS at a higher level. The RLUP should therefore seek to understand how the objectives and implementation of policies together impact the delivery of ecosystem services. Such an understanding may help to minimise conflicts and to make relevant decisions when it comes to make some inevitable trade-offs.

Policy analysis focussed on policy objectives looks at the potential relationships involved in the RLUP. However, the real test lies with how policies are implemented in particular places by particular people. Thus, it will remain important to evaluate how policy objectives, the LUS principles and the Ecosystem

Approach are met in practice. Furthermore, the combination of the LUS and its principles highlights the importance of going beyond an assessment of ecosystem services, to the wider societal objectives of better linking people with their environment and use of land.

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INTRODUCTION

This project forms part of the Regional Land Use Pilot (RLUP) project's implementation in Aberdeenshire. The RLUP is an attempt to translate the Scottish Government's Land Use Strategy (LUS) to the regional level. The LUS emerged from the Climate Change (Scotland) Act 2009 and was published by the Scottish Government in 2011. It is a strategic framework aimed at finding long-term solutions to get the best from Scotland's land resources, as well as to help us think more strategically with regard to the potential of Scotland's land and its use now and in the future. The implementation of the Land Use Strategy should lead to a more prosperous and equitable nation.

Questions have emerged about how best to operationalize the LUS and it was therefore decided to set up two Regional Land Use Pilots (RLUP), one in Aberdeenshire and one in the Scottish Borders, to "test and evaluate the practicality of preparing regional land use frameworks" (Scottish Government, 2013). This learning process should allow the Scottish Government to reflect on the best way to apply the Land Use Strategy at the national scale.

The LUS (and by implication the RLUP) seeks to employ an Ecosystem Approach to ensure that land use is managed in a collective and integrated way. An Ecosystem Approach is a "*strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way*" (United Nations, 1992). The participation of all interested parties is emphasised as an essential requirement for the sustainable management of natural systems to guarantee the continuous delivery of ecosystem services on which human well-being and economic prosperity depend. Ecosystem services are here defined as 'the outputs of ecosystems from which people derive benefits' (UK NEA 2011). Identifying and assessing ecosystem services from current land use can constitute a useful input to an Ecosystem Approach, but does not in itself constitute such an approach with its emphasis on participation and equity. In this report we try to reflect this distinction in the analyses and discussion of the results.

The RLUP aims at achieving a more efficient and optimal use of the land, benefitting the local economy, environment and society and establishing a mechanism to prioritise or guide decisions about possible competing or conflicting land uses. From the outset, the RLUP has been divided into three phases. The first one consists of establishing a baseline by means of mapping existing policies and environmental assets. The second phase encompasses the identification of constraints and opportunities for land use management building on the baseline mapping produced in the first stage. The third phase consists of the delivery of a regional framework for the implementation of the LUS by the beginning of 2015.

The overall aim of this study is to support and complement the work of Aberdeenshire Council by conducting a governance and policy analysis which can provide useful insights into the opportunities and constraints to the implementation of the RLUP. More specifically, the objectives of this study are:

- ➢ To understand and assess how well existing policies and their objectives fit with the Land Use Strategy and the Ecosystem Approach at a local scale;
- ➢ To identify the institutional and governance-related barriers to aligning the Land Use Strategy and its regional Pilot with an Ecosystem Approach.

To meet the objectives, the study has been divided in three main parts:

1. A policy analysis which consisted of analysing the main policy instruments with regard to their effects on the delivery of ecosystem services as well as the complementarities and conflicts between these different instruments;

2. A stakeholder analysis highlighting the relationships of stakeholders with the delivery of ecosystem services and their possible contribution in the delivery of the RLUP and an Ecosystem Approach;

3. An analysis of the opportunities and constraints for the implementation of the RLUP by using an Ecosystem Approach.

METHODS

1. Policy analysis

The success of the Regional Land Use Pilot hinges on its relationship with other initiatives and established policies. Indeed, the framework should reflect the Scottish Government's policies relevant to land use. Thus, identifying the barriers and opportunities to the implementation of the RLUP by using an Ecosystem Approach is essential to ensure the creation of a comprehensive, coherent and locally adapted framework. In addition, the first stage of the RLUP consists in a policy and environmental assets mapping to further identify opportunities and constraints. The goal of the policy analysis is to reflect on the implications of stacking multiple land use targets for the delivery of ecosystem services, as the regional framework will aim to do. This is only a thematic mapping, therefore it does not include a spatial dimension; however, it should provide an insight on how policy targets and ecosystem services overlap each other and on conflicting objectives and targets of policies.

a. Analysis of the main policy instruments affecting delivery of the ecosystem services

The goal of this step is to assess the impact policy instruments can have, whether positive or negative, or direct or indirect, on the delivery of ecosystem services such as defined in the UK National Ecosystem Assessment. This analysis allows us to classify the policy instruments into categories and identify the kind of policies or objectives that could negatively affect the delivery of ecosystem services. This step also aims to highlight the need to think in terms of "system", by pinpointing the unintended effect of policies.

The following sections provide information on the selection of the policy instruments; the determination of the ecosystem services typology; the creation of the matrix and the definition of the potential impacts and finally an explanation of how the impacts have been analysed.

Selecting the policy instruments

The policy analysis focuses on policy instruments listed in the Regional Land Use Pilot methodology (Scottish Government, 2013) and which should reflect the national, regional and local targets of the Scottish Government for the area. This list has been prepared by the Scottish Government and aims at including the other initiatives and established policies that the regional framework should recognise and integrate. The present analysis has been built on this list for more consistency in order to ensure that there is coherence between the work of Aberdeenshire Council and this present piece of work. Thus, the results could be used to complement their work and should provide an insight on how the selected policy instruments interact with the delivery of ecosystem services.

The list is very heterogeneous, containing high level strategic documents as well as more local and operational documents including Acts; Frameworks; Schemes; Strategies and Conventions. They cover a wide range of themes such as forestry; biodiversity; climate change; community involvement; etc., and reflect the Scottish Government's aspirations for integrated land use.

Thirty-four policies were cited in the list. However, five of these were judged not to be relevant for this analysis. The five policy instruments were not analysed for the following reasons:

➤ "Calculating carbon savings from wind farms on Scottish peat lands: New Approach" as this refers to a methodology;

➤ "Skills Development Scheme" as this does not state a clear objectives that can be analysed;

➤ "Low Carbon Scotland: Public engagement Strategy" as this acts only on people's behaviour and has therefore a too indirect impact on the delivery of ecosystem services;

➤ "Scottish Sustainable Communities Initiative" as this is not applied in Aberdeenshire;

➤ "Community Empowerment and Renewal Bill" as this does not provide sufficient details to allow an analysis, as the final version is supposed to be published in summer 2013.

Thus only twenty-nine policy instruments were included in the policy analysis. All of the included policies were judged to be relevant as they express the Scottish Government's aspirations and objectives for the study area. It is very likely that there are other relevant policies, which were not listed in the Regional Land Use Pilot methodology document, but in order to ensure correspondence of the analysis with the work of Aberdeenshire Council, it has been decided to stick to these ones mentioned in the methodology document.

Determining the ecosystem services typology

There are several typologies which can be used to classify ecosystem services (De Groot *et* al, 2002; UK- NEA, 2011; Haines-Young & Potschin, 2013). For the need of the analysis, we have decided to use the typology defined in the UK-NEA as this one is one of the most recognised typologies and it is adapted to the UK context. In addition, the technical report provides a clear definition of each ecosystem service and gives a description of the various drivers of change likely to affect the considered ecosystem service. This information has been taken into consideration and used as a guideline for the analysis.

In this typology, there are sixteen ecosystem services divided into the following four categories: supporting; provisioning; regulating and cultural services.

Creating the analysis matrix and defining the different impacts

The analysis of the impacts of the policy instruments on the delivery of ecosystem services used a matrix where each policy is compared with all the ecosystem services. We have chosen to use a matrix because it is a very visual tool that can be built and understood easily. It also makes it easier to analyse large data sets as they can be divided into smaller units. It is an approach quite commonly used in studies related to ecosystem services (UK National Ecosystem Assessment, 2011; Potschin & Haynes-Young, 2013). The approach taken here was inspired by these studies, the work of Jose Muñoz-Rojas[1] from the James Hutton Institute and the methodology of a Strategic Environmental Assessment (H2E, 2012) and corresponds to an *ex-ante* analysis. Thus it aims at showing the potential and not the actual effects of the policies on the ecosystem services. There are several reasons why it was not possible to look at actual impacts:

➢ Considering the number of policies, the timescale was too short to implement an *ex-post* analysis that would have required using indicators and meeting stakeholders to discuss the policies' impacts;

➢ Most of the policy instruments are relatively new and have not all been implemented yet, thus it is not possible to assess their actual impacts;

The table is composed of the following seven headings: the name of the policy; the scale of application; the main objectives or aspirations of the policies; the relevant ecosystem services; comments to guide the reader; the stakeholders who produce or benefit from the ecosystem services and that are linked to the policy, and finally additional comments or sources.

Due to the lack of existing appropriate methods to analyse policies and to compare them with ecosystem services, this analysis required a lot of work to define the most suitable methodology. It has been decided to use a different approach than the one used by Jose Muñoz-Rojas, who analysed each policy instrument as a whole. Conversely, here each policy instrument has been analysed depending on the various aspirations and objectives it aims at achieving. This method was to understand the policies and to divide them into clear objectives to simplify the analysis. In addition, this allows an accurate investigation of the impacts and to highlight the trade-offs that are being made within the document itself. Indeed, most of the policies include mitigation measures that ease the effects of some of their objectives.

The policy instruments to analyse were very heterogeneous and if some that contain clear aspirations or objectives, others are trickier. Indeed, they do not state clear aims, such as "The Whole Farm Review Scheme" or all the Scottish Acts. In such cases, the analysis has therefore been based on the interpretation of what it intends to achieve overall.

Moreover, for some policy instruments, it was more relevant to use the actions rather than the objectives for the analysis due to their more operational scope; this is the case for the "Scottish Adaptation Framework" for instance where the analysis has been based on all the actions related to the 12 sectors defined by the policy.

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Concerning the "Scottish Soil Framework", the analysis has been based on the soils outcomes as the actions were too strategic to be considered. Indeed, as "Low Carbon Scotland: Public engagement Strategy", they would have a really indirect impact on ecosystem services as they are related to awareness raising, policy integration, knowledge exchange and research. This analysis required to "cheat" a little bit because, as these are outcomes and not actions, we do not know if they really have an impact on ecosystem services and how. In effect, the outcomes represent the benefits that should be delivered by the ecosystem services. However, it is possible to think about this as a virtuous circle: ecosystem services will contribute to delivering outcomes. In turn, the outcomes will help maintain the ecosystem services that support their delivery.

For each objective, only the most relevant ecosystem services have been analysed in order to avoid duplications with other objectives. For instance, the various objectives of the "Rationale for Woodland Expansion" all support the expansion of the woodland cover, but they have different targets. Indeed, many benefits can be delivered through forest cover expansion; however, in this analysis we try to focus on the benefits brought by each specific objective in order to simplify the analysis without making it simplistic. This method should be sufficient to capture the complexity of the relationships between all the components. The selection is necessary to emphasize the differences and pinpoint the pertinent ecosystem services affected.

The Regional Land Use Pilot does not specifically specify the sectors to include in the analysis, but states that all relevant sectors should be integrated. Thus, some sectors of the Scottish Adaption Framework have not been analysed because, after reading and analysing them in the matrix, they did not seem relevant to the analysis as they had no impact on the ecosystem services. Thus "Emergency and Rescue Services" and "Transport" have not been covered. Transport deal with safety issues, driving and infrastructure adaptation, which have no direct impact on the delivery of ecosystem services. It is important to note that even if they do not have a relationship with the ecosystem service assessment, these two sectors might be important in the context of the Regional Land Use Pilot and the Ecosystem Approach, as they are likely to be part of an integrated management of the land.

Five categories of potential impacts have been defined and are summarized in Table 1.

Table 1: Classification of the potential impacts a policy instrument can have on ecosystem services

+	**Positive direct impact (i.e. intended) on the Ecosystem Service:** The positive effect the policy intends to have on the ecosystem service
+	**Positive indirect impact (i.e. unintended) on the Ecosystem Service:** The unintended or indirect positive effect on the ecosystem service that results from the implementation of the policy. An indirect effect can also be intended but achieved through indirect means.
-	**Negative indirect impact (i.e. unintended) on the Ecosystem Service:** The unintended or indirect negative effect on the ecosystem service that results from the implementation of the policy.
?	**Ambiguous:** The impact of the policy on the Ecosystem Service cannot be determined because it depends on too many factors

0	No impact on the Ecosystem Service:
	The policy instrument has either no relationship or too much of an indirect relationship with the ecosystem service

The analysis focuses on the intention of the instrument, that is to say, what the policy tends to achieve. This defines what we call a direct effect or intended. A direct effect can only be positive, indeed no policy aims to intentionally harm the environment. For instance, the National Planning Framework advocates to "Conserve and enhance Scotland's distinctive natural and cultural heritage and continue to safeguarding internationally protected sites, habitats and species", which has a direct positive impact on wildlife species diversity as well as on environmental settings. However, effects on other ecosystem services that have not been planned by the policy[2] can occur; these are unintended or indirect effects. An indirect effect can either be positive or negative. The same objective cited previously contributes indirectly to the delivery of regulating services such as "hazard regulation" or "pest and disease regulation". Conversely, promoting the sufficient supply of homes is likely to have unintended negative impacts, on the water cycle for instance, because of soil sealing.

There are also many cases where an objective does not have any impact on the ecosystem services, either because there is no relationship at all, or because there is a too indirect relationship, in that the objective is likely to have an impact on the delivery of ecosystem services but over a long time by using very indirect means. The objectives likely to have no impact are mostly related to research, guidance, influencing people's behaviour or mainstream into policy. They have the ability over the long-term to act positively on the delivery of ecosystem services at a large scale but cannot be considered in this analysis because they depend on too many factors such as how stakeholders will understand the messages or their eagerness to consider the advice and effectively apply them to their land management decisions and practices. Thus, a very indirect means implies more than two causal mechanisms. As a consequence, an indirect effect can be taken into consideration if there is only one "node on the chain" that links it to the ecosystem service.

For instance, the Scottish Outdoor Access Code asks people to "Care for (their) environment", which should overt time lead to a healthier environment, but whose effects are very uncertain. In "Our Rural Future", an objective promotes "More community control of assets/resources". In this case, we cannot predict how communities will manage their land; it will depend on their personal objectives. There are case studies that could be analysed in order to draw conclusions, but we did not have the time for this analysis to do so. In addition, the case studies will always be context-dependent; therefore guessing the impact on ecosystem services will also be context-dependent and strongly influenced by the aspirations on the community. If a proper environmental education is provided, it is likely that people's way of managing the land will be oriented towards sustainable development, but even in this context, we can just make assumptions. Concerning "Low Carbon Economic Strategy for Scotland", most of the objectives also aim at providing a sympathetic framework for the development of renewable energies, of low carbon industries and buildings through research, guidance and mainstream to policy. Thus, most of the objectives do not have an impact on ecosystem services or this one is too indirect to be

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[2] However, these unintended effects can be mitigated through specific measures included in the instruments or through other objectives that balance the detrimental effects

considered. The same reasoning has been applied to all the policies which objectives aim at "gathering evidence", "promoting", "supporting" or "encouraging" a specific behaviour or practice.

However, even if these kinds of objectives are not directly related to the provision of ecosystem services, the approach might be interesting in the context of an Ecosystem Approach as it includes a strong human dimension.

Finally, an ambiguous impact has been defined as an impact which positive or negative nature cannot be decided because there are conflicting aspirations within one objective. For instance, in the National Marine Plan, the aim "To sustainably manage migratory and freshwater fish and fisheries resources and provide significant economic and social benefits for the people in Scotland", has an ambiguous impact on the ecosystem service "Crops, livestock, fish". Indeed, the sustainable management of the stock can have a potential positive impact on fish resource; however, the development of an angling tourism is likely to have negative impacts on fish resource if it is not properly managed. It is hard to predict which balance will be found between these two aspects.

Analysing the impacts of the policy instruments upon ecosystem services

In order to determine with certainty whether the impact of policies is positive or negative it would be necessary to look at how the policy instruments are being used to achieve their objectives. However, the aim of this analysis is not to predict the impact of the implementation of the policy, but to reflect the intentions. Therefore, it is really important to stick to the policy and try not to go too far in the reasoning even if everything is intertwined. Indeed, even if ecosystem services have been put into boxes in order to simplify the analysis, this does not mean that they are not affected by decisions or actions that focus on another ecosystem service. In this analysis, we have tried to show the potential impacts, and in particular all the side effects, of the decisions on the ecosystem services to point out that it is necessary to think in terms of system. However, it is almost impossible to think about all the side effects and the decision has been made not to consider effects judged as too indirect.

The impact of the policy has been evaluated depending on how it affects the ecosystem services and not the goods or benefits. For instance, "air quality" is the good achieved through a process of purification or detoxification; these are the ecosystem services (Figure 1). Some policies aim at improving the air quality by reducing the load of pollutants, but this does not involve any ecosystem function. Consequently, these policies have no impact on the ecosystem services. This reasoning has been applied equally to the whole analysis in order to ensure consistency. Establishing of the impact of an objective on an ecosystem service is a matter of interpretation, which has to be carefully and clearly explained, hence the usefulness of the comments column.
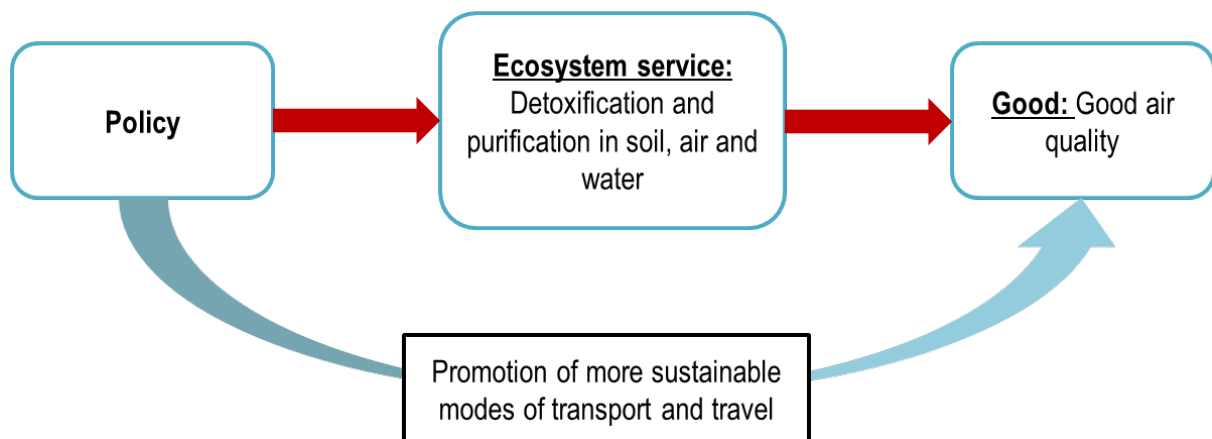
Figure 1: The two ways of contributing to air quality

Each ecosystem service has been considered case by case, which is not easy considering that they are all strongly interrelated. Indeed, the boundaries between ecosystem processes, ecosystem services and goods are very narrow. For this reason, it can be difficult to disentangle them and not to consider that an objective has an impact on all ecosystem services even if this one is too indirect. In addition, as the ecosystem functions underpin the ecosystem services, there is often a double counting that could have been avoided if we had decided to consider only the ecosystem services. This is the case with the water cycle and the water supply for instance, as the water cycle underpins the provision of sufficient water. Indeed, what affects the water cycle affects the water supply, whereas the opposite is not true.

There was also an important decision to make concerning the wildlife species diversity. Indeed, it represents a contentious point because this ecosystem service belongs to two categories depending on which good it provides. In almost all the cases, the impact of the policy instruments affect wildlife species diversity – the provisioning service – and wildlife species diversity – the cultural service- the same way, so it has been thought to merge the two columns as it is difficult to distinguish them. However, as we found two exceptions in the Scottish Government Rationale for Woodland Expansion Cover and in the Cross-Compliance Guidance, we decided to keep them separated. Also, if we were to merge the two columns, which category would prevail on the other?

b. *Analysis of the complementarities and the conflicts between the different policy instruments*

Aberdeenshire Council is willing to create a framework by using an Ecosystem Approach in order to ensure that land use is considered in a collective and integrated way so that conflicting or competing uses of land are minimised and land use configurations that optimise the delivery of benefits to society are maximised. This step aims at highlighting the synergies or the conflicts between the policies and at showing which kind of objectives can be the most ambiguous in relation with the delivery of ecosystem services. This will provide an insight on conflicting objectives and targets, to support the work of Aberdeenshire Council.

Selecting the policies

The methodology has been inspired by the work of Jose Muñoz-Rojas[3] who has analysed the complementarities and conflicts of many policies, including some of this analysis.

This study has been built in a flexible way, allowing it to evolve and to adapt to new findings and conditions. Therefore, the methodology of this step has been changed to consider the new context emerging from other parts of the analysis' results. At the beginning of this study, it has been decided to compare every policy instruments with each other in a big matrix. Regarding the time available for this step and the results of the policy-ecosystem services matrix, it has been decided to select only a certain type of policy. Four types of policies have been identified in the results (see Classifying the policies), corresponding to their relationship with the delivery of ecosystem services. For this step, we will look at "ambiguous" policies, which represent policy instruments that tend to have an integrated approach of land use and to include the three pillars of sustainability in their objectives.

These policies have been chosen because they represent key documents for planning and their objectives well reflect what Scotland aims at achieving. In addition, the RLUP is likely to become an ambiguous document as it will have to recognise all the existing initiatives and policies and incorporate them into a coherent framework. Thus, comparing only the ambiguous documents, whose objectives are likely to be more conflicting, should provide a useful insight to Aberdeenshire about conflicting or competing targets.

The documents that have been chosen for this analysis are: National Planning Framework 2; The Scottish Government's rationale for woodland expansion; Recipe for Success - Scotland's National Food and Drink Policy; Policy on Woodland Removal; Our Rural Future; Scottish Planning Policy 6; Low Carbon Scotland: Meeting the Emissions Reduction Targets 2013-2027; The Scottish Forestry Strategy and the National Marine Plan.

Analysing the complementarities and conflicts

The policy instruments are compared to each other into a matrix. For this study, two matrices have been created: one showing the complementarities and conflicts between the objectives and targets of the 9 ambiguous policies and one showing the complementarities and conflicts between their impacts on the delivery of ecosystem services. It has been decided to create two matrices to highlight the differences between what a policy intends to do and how it intends to do it. This last point will change the way a policy affects the delivery of ecosystem services and as a consequence, the well-being of the communities or the economic benefits these ones can get from nature. Indeed, some objectives may appear to coincide and be very synergistic when they are expressed very strategically, but when it comes to operationalize them, their impacts may differ a lot because the way policies intend to put into practice their objectives are very different. The two matrices have been created to detect these differences and conflicts and put the stress on the contentious points the regional framework will have to tackle in order to ensure a good correspondence among policies and a coherent and optimal land use.

Both of these matrices have been built by using the intentions of the policies and on their potential impacts, thus they highlight only the potential conflicts and complementarities. In addition, these

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matrices should emphasize the conflicting land uses and thus the potential trade-offs that will be necessary to make. This should be very useful for the second phase of the RLUP as it aims at harmonizing the policies and at reducing the conflicts between them and various land uses.

The analysis will aim at showing complementarities and conflicts by using a simple code (Table 2).

Table 2: Complementarities and conflicts colour code

S	**Synergistic** The two policies are synergistic as their objectives/targets or influence on the delivery of the ecosystem services perfectly coincide
C	**Conflicting** The objectives/targets or the influence on the delivery of ecosystem services of the two policies under consideration do not coincide and compete with each other.
C/S	**Potentially conflicting and synergistic** Two policies may appear overall synergistic but they could be conflicting on specific sites or objectives. They could also share common objectives but have a very different influence over ecosystem services. Two policies may appear overall conflicting but they share some common objectives or a common influence on the delivery of specific ecosystems that could make them synergistic on specific points.

2. Stakeholders analysis

The Regional Land Use Pilot and the Ecosystem Approach advocate the maximum involvement of stakeholders. Indeed, the RLUP clearly states that the framework should be prepared in partnership with all locally relevant stakeholders to respond to its 9th Principle and to meet the objective "linking people with the land" of the LUS. Thus there is a need to think about who to engage with and how the stakeholders will influence the delivery of (1) ecosystem services, (2) the RLUP and (3) the Ecosystem Approach. In addition, the RLUP's aim is to reduce the conflicts related to land use to maximise the benefits. Therefore, it is important to understand how stakeholders relate to each other and what their relationship is.

This step aims at emphasising the role of the various stakeholders in the delivery of ecosystem services and at identifying the relationships between them.

Establishing the list of stakeholders

The first step consisted in identifying all the stakeholders that are directly or indirectly involved in land use and to establish an exhaustive list of them. The first raw list has been created by using the various policy instruments analysed previously. Indeed, most of them refer to a range of stakeholders involved

in, or affected by, the implementation of the policy instrument and these ones have been listed in the table used for the analysis. Other stakeholders not cited in the policy instruments have been added to the column due to their relevance with the topic under consideration. For instance, local communities or visitors/tourists are not often cited, but they represent very important stakeholders and are often highly affected by the delivery of ecosystem services and the decisions made over land management, hence the need to include them in the list .(Reed, 2008). In addition, there is a need to consider them as the involvement of local communities is a requirement of the Ecosystem Approach in the 1st, the 11th and the 12th Malawi Principles (Governments of the Netherlands and Malawi, 1998).

Then, some experts on coastal management, deer management, forestry or stakeholder's consultation, from James Hutton Institute have been consulted to complete the raw list. These people are indeed used to interact with stakeholders and know very well the Scottish and the regional context as they have all worked in Aberdeenshire. They were able to pinpoint organisations locally active and to complement the list in a very efficient way. In addition to this, the websites of the various stakeholders have been consulted in order to find useful links to other relevant stakeholders that could be added to the list. For instance, the website of Aberdeenshire Council or the Scottish Environment Link provided previous information on stakeholders. A first sorting has been made simultaneously to select only the most relevant stakeholders for this analysis, i.e. the ones for which it is intuitively possible to pinpoint the ecosystem services related to them. At the end of this step, 103 stakeholders were listed.

The stakeholders have then been organised in a table depending on the classification provided by Pound (2006). This was a first way of organising them to make sure not to forget anyone and to start classifying them. It will be useful later to compare the impact of the types on the delivery of ecosystem services and to see which type is the most likely to affect or to be affected by the provision of ecosystem services. Thus, 4 categories have been defined:

- ➢ **Public Sector:** it includes Government Agencies (e.g. SEPA), Local Authorities (e.g. Aberdeenshire Council), Ministries (e.g. Ministry of Defence), Regional Agencies, as well as organisations that are partly funded by the Government such as Visit Scotland
- ➢ **Private Sector:** Corporations, Business, Industry, Commerce, Professions, Business Associations. In this sector, there are, for instance, the forestry industries or the tourism-based businesses.
- ➢ **Academics/Researchers:** Universities and Colleges (e.g. Aberdeen University), Research Institutes (e.g. James Hutton Institute), Field Studies Centres
- ➢ **Third Sector:** it groups together "Community Groups" and "Voluntary Groups". It includes Resident Associations, Environmental and Conservation Charities, national organisations and associations with local branches, Archaeological charities, Recreation Groups.

In addition to this, two categories of stakeholders that do not fit in any of these categories have been added. These are "local communities" and "Visitors/Tourists".

Once the list has been established, two columns have been added to the table. The first one represents the sector of the stakeholders and the second one is their scale of action, where local, national or at the UK-scale. The typology used to define the sectors is the one that has been created for the action plans

of the "Scottish Adaption Framework". There are 12 sectors including Agriculture; Biodiversity; Built Environment; Business; Emergency and Rescue Services; Energy; Forestry; Health; Marine; Spatial Planning and Land Use; Transport and Water[4]. At the beginning, all stakeholders from all the sectors have been included in the table, but after trying to compare them with ecosystem services, it appears that the relationship between flagship stakeholders of these sectors such as National Health Service Grampian or Scottish Fire and Rescue Services, were too indirectly linked to the ecosystem services to be considered. Thus Health and Emergency and Rescue Services have not been included. However, to ensure that these sectors have been considered, they have been diluted in other stakeholders such as local communities, visitors and tourists, whose health and well-being is linked to the provision of ecosystem services.

Finally, there are four types of stakeholders plus local communities and visitors/tourists that belong to 10 different sectors. This typology will be useful to see the links between the different sectors and how the stakeholders interact with regards to the ecosystem services.

Then, a description of each stakeholder has been added in another table in order to understand what are their missions and their goals and above all how they intend to achieve them. This is very important to conduct the analysis because it helps understand how they interact with the ecosystem services. The information has been found on the websites of the various organisations.

The stakeholders have then been sorted, reorganised and grouped into different categories in order to reduce their number to make the analysis easier and to include only the ones that are likely to affect or be affected by the delivery of ecosystem services. The goal is to keep only those stakeholders that are the most likely to affect or be affected by the delivery of the ecosystem services given their interests, resources and influence. In addition, the goal of this analysis is not to understand how each specific stakeholder interacts with an ecosystem service, but rather to understand how a specific sector affects or is affected by the delivery of the ecosystem services and which relationships exist between the stakeholders and the sectors. However, the organisations classified as public have been left as single distinct stakeholders because the Regional Land Use Pilot and the Land Use Strategy are focussed on public agencies as the Scottish Government directly controls them. Thus they have to take into account the Land Use Strategy when they make plans or decisions, and as a consequence, to the delivery of ecosystem services. Yet, the private and third sectors are not required to do so, and can only be influenced by the Scottish Government through organisations classified as public. These ones generally have a very important role, sometimes with regulatory powers, and can have a lot of influence due to their political dimension. Moreover, this it is interesting to see how they interact with each other and with the other categories of stakeholders to help facilitate the decision-making processes and decide with whom engage when they will have to make decisions that can affect specific ecosystem services.

The private sector is composed of businesses related to the different sectors, such as fishery-based businesses, developers or farmers included in land owners and land managers. Land owners is a very heterogeneous category which brings together all types of land owners, which manage the land for various objectives, whether forestry, games species, agriculture or conservation. The academics and researchers have been classified into two categories that correspond to research institutes and

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[4] More information about the sectors can be found at this address:
http://www.scotland.gov.uk/Topics/Environment/climatechange/scotlands-action/adaptation/AdaptationFramework/SAP

universities. Finally, the third sector, composed of the most important number of organisations, has been organised according to the following categories that cover all the organisations[5]:

➢ **Organisations/groups committed to carbon reduction and energy savings:** their role is to encourage public and private sector and communities reduce their carbon footprint and use energy more sustainably. They generally provide advice and education to guide people towards this direction. They also provide technical or financial support.

➢ **Game management organisations:** They generally act at a political level and promote the role of gamekeepers, stalkers, ghillies, wildlife managers and rangers in the management of the Scottish environment and highlight the contribution country sports make to the Scottish rural economy. They represent the voice of the gamekeepers and help them understand the political context to ensure that they are considered in decision-making and that their welfare is taken into account. However, some organisations are also involved in deer management in order to make the populations' size suitable in terms of the environment and compatible with other land uses.

➢ **Recreational Organisations:** Their goals are heterogeneous and consist, amongst other things, in educating people about nature, encouraging them to practice outdoor activities and safeguarding public access to land. They achieve their goals by educating and raising people's awareness, but also by campaigning to reach and influence policy makers. Recreational organisations also include various sport clubs linked to outdoor activities such as kayak, walking, etc.

➢ **Conservation Bodies:** They include various organisations that are either single-species focused or that have an overall interest in conserving or restoring nature. Their goal is to protect the environment and they meet their objectives through a vast array of actions, from restoration and management of natural resources or species, to awareness raising or education or advice. Some associations also act at a political level and try to influence the development of legislation and policy in favour of nature's welfare. Some run campaigns to influence decision-makers. This category of stakeholders does not include land management activities, which are comprised in land owners and managers category.

➢ **Community empowerment oriented organisations:** These organisations are not directly acting on the delivery of Ecosystem Services. However, they are committed to "trap" the benefits at a local scale to empower the local communities and allow them to develop economically. They act at a political level and promote management by local communities for the benefits of local communities. There are, nonetheless, some organisations such as Reforesting Scotland that can interact directly with Ecosystem Services through their projects and actions.

The last level of sorting was based on the way stakeholders fit with the delivery of Ecosystem Services and if they are specific enough to pinpoint the Ecosystem Services with which they interact. Indeed, there are two layers of interactions with land management to consider:

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[5] Note that some organisations can fit in several categories, such as Reforesting Scotland, which could be placed in the private sector in the forestry group, in the community empowerment oriented organisations or in recreational organisations.

> The first one relates to **on-sites specific actions** of stakeholders that will affect more or less directly the delivery of ecosystem services;

> The second one is mostly related to **awareness raising**; **advice**; **guidance** and **influencing** and corresponds to a wider context where stakeholders do not directly interact with the delivery of Ecosystem Services. Their actions are proactive rather than reactive, thus their influence over ecosystem services is more remote and would be achieved by very indirect means, over greater periods of time. However, these actions contribute to setting up a favourable context for the delivery of an Ecosystem Approach. Indeed, stakeholders' actions fall, most of the time, within the **research or education field** or the **political lobbying** and should not be considered in this analysis. Thus, the Academics/Researchers sector has not been taken into account, nor have bodies like representative organisations of a sector, such as Scottish Land & Estates, National Farmers Union Scotland nor Scottish Fishermen's Association, which illustrates perfectly the kind of stakeholders involved at this level.

Finally, after sorting the stakeholders, the list only contained 28 of them that have been put into a similar matrix that has been used for the policy analysis.

Analysing the relationship between stakeholders and the ecosystem services

The analysis consisted in comparing each stakeholder category with each ecosystem service and in evaluating the relationship between them based on a specific colour code.

Table 3: Classification of the relationship between stakeholders and ecosystem services

	Affects the delivery of the ecosystem service Delivers; protects; enhances; restores; disturbs; damages or pollutes
	No effect The organisation does not interact directly with the ecosystem service
	Affects and is affected by the delivery of the ecosystem service Can either affects or be affected due to its activities
	Affected by the delivery of the ecosystem service Receives; depends on or benefits from

This analysis aims at showing the potential impacts of the stakeholders on the delivery of ecosystems services. Indeed, assessing the actual impacts would require to proceed case by case and to use case studies, which is not possible to do regarding the amount of time available. In addition, the stakeholders have been grouped into categories, which limit the possibility of doing a case by case analysis. The potential impacts have been determined based on our expert opinion and on studies which are listed in

the sources of the table. For more consistency, more experts' reports and documents could be used in the future.

Furthermore, as the analysis focuses on the potential impacts, it does not consider political or economic drivers, such as EU policies or market forces, which can influence stakeholders' behaviour, because we do not seek to assess the actual impacts and also because there is a great uncertainty with regards to what they will look like in the future.

The relationship between an ecosystem service and a stakeholder can be of two kinds: either the stakeholder affects the delivery of an ecosystem service, or it is affected by the delivery. Sometimes, however, it can at the same time be affected by, and affect, the delivery of an ecosystem service. This is the case for Scottish Water for instance, whose activity relies on water supply to satisfy consumers' demand, but it can also affect it if the demand increases, leading to increase in water abstraction.

As for the policy analysis, it is very important to focus on the ecosystem services and not to consider the goods and benefits resulting from them. For instance, the forestry-related industries may depend on timber for their activity, however, timber is a benefit underpinned by supporting services such as primary production, by regulating services such as pollination or by provisioning services such as trees.

A stakeholder affects the delivery of an ecosystem service when it contributes to delivering the ecosystem service. For instance, Scottish Natural Heritage contributes to increasing the interactions between nature and people by conserving, restoring and enhancing the natural and cultural heritage i.e. the environmental settings. Games species management organisations, for instance, are committed to manage sustainably games species populations and to increase their welfare and therefore contribute to delivering provisioning services. Conversely, land managers can affect the delivery of ecosystem services through their activity by polluting the water resource with organic and chemical components for instance, which could in turn affect the water supply. Their activities also produce CO_2, which contributes to disturbing climate regulation services.

The delivery of Ecosystem Services can also be affected by stakeholders in a more indirect way, linked to regulating and incentivising functions. Indeed, government bodies and public agencies such as SEPA, through incentives and policies, help set up a whole context that can promote the importance of Ecosystem Services, even if this acts generally in a more indirect way. Conversely to awareness-raising, research or education, regulations and incentives act directly on people's behaviour and the effect of their influence can be quickly observed. Regulations generally act in favour of the protection of the environment, whereas incentives are rather related to the enhancement and the restoration of the environment

A stakeholder is affected by the delivery of an ecosystem service when its activity or welfare relies on it. Thus, the benefits can either be financial or linked to health or social well-being (UK National Ecosystem Assessment, 2011). For instance, Scottish Water's activity depends on water supply and natural purification and detoxification of water processes to deliver a society service. Local communities benefit from the provisioning service – water supply -provided by the environment through Scottish Water. They also enjoy access to green spaces, which can be improved or favoured by other organisations, and thus benefit from the delivery of cultural services. In addition, regulation services such as detoxification and purification of air contribute to improving their health and well-being. Land

managers rely on an equable climate for their rural activities, especially cropping, which is affected by climate regulation processes.

Both direct and indirect effects are considered in this analysis even if no difference is made in the colour code. Thus, unintended effects activities can have on the delivery of ecosystem services have also been highlighted. For instance, oil and gas industries' activities do not voluntarily harm the environment, but they still disturb wildlife species and oil spills can be very detrimental for the biodiversity.

Identifying the relationships between stakeholders

Once the previous step has been completed and the table filled, it is possible to build an interest-influence matrix for each Ecosystem Service to map stakeholders (Eden & Ackermann, 1998; De Lopez 2001; Reed *et al.*, 2009) (Figure 2). This grid presents the advantages of being visual and allowing finding patterns in the distribution of the stakeholders (Reed et *al.*, 2009). In addition, this visual representation also allows classifying stakeholders in function of their interests and influence (or power) on ecosystem services and identifying the relationships between them, whether collaboration, cooperation, competition or threat (Bryson, 2004). Four categories of stakeholders can then stand out from the grid, "Key players"; "Context setters"; "Subjects" and "Crowd". To understand these categories, it is necessary to define what "influence" is and what "interest" is. This is also essential in order to weight each stakeholder to place them in the matrix. In this context, influence - or power - represents the ability of a stakeholder to affect the delivery of a specific ecosystem service, whereas interest is the stake of each stakeholder in a particular ecosystem service (Eden and Ackermann, 1998). Influence is thus the ability of a stakeholder to deliver; protect; enhance; restore; disturb; damage or pollute, while the interest is linked to the dependency to an ecosystem service and the benefits a stakeholder gets from it.
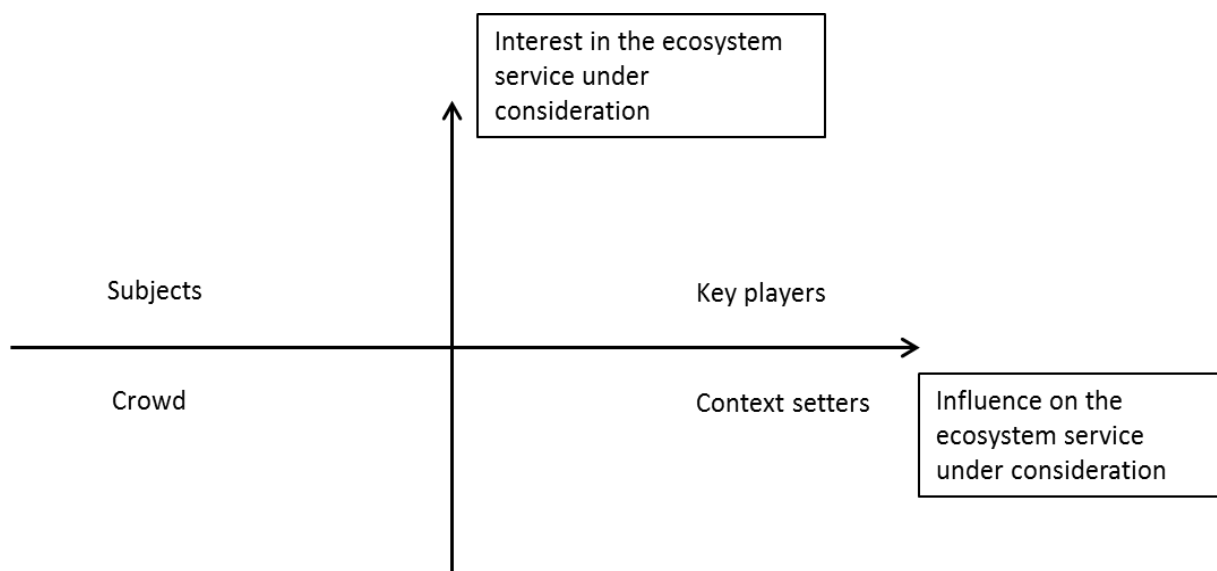
Figure 2: Interest-influence matrix model. Source: Eden & Ackermann (1998)

Key players have a high interest and a high influence on a particular ecosystem services, thus they should be actively consulted and involved in the decisions that could affect the delivery of the ecosystem service under consideration. Context setters generally have a little interest in the delivery of an ecosystem service but a high influence, thus it is very important to engage with them to influence their behaviour and their mind-set to make them become supporters rather than opponents. Conversely, Subjects have a high interest on a specific Ecosystem Service, but their influence is very limited. Finally, the "crowd" represents stakeholders who have little interest and little influence over the Ecosystem Service considered and there is not much need to engage with them. However, their interest can change over time or they can become more influential by forming alliances with other stakeholders. For instance, small conservation-oriented associations can gain power by receiving the support from a bigger association, by forming an alliance with other associations to become an umbrella organisation or by gaining more members that could give their voice more weight. Similarly, context setters can become more interested in an ecosystem service and become a key player. Aberdeenshire Council can for instance decide to actively orient its policy towards renewable energy and increase its interest in climate regulation. A subject can also become more influential and become a key player as well. Everything will depend on the political and the economic context and this is very hard to predict how influence and interest will vary for each stakeholder; however it is necessary to take into account that everything can change. Some arrows will be represented on the grids to show how some stakeholders can move from a case to another.

The influence can be of 3 different kinds, based on Etzioni's (1964) classification[6]:

> **Coercive power:** the organisation gains influence through threat and punishment, it exerts a constraining force that it applies to those that do not comply. In this analysis, the coercive power can be assimilated to regulatory powers of governmental agencies such as SEPA.

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[6] This classification will be used further in the report, about the Ecosystem Approach. See Thinking about applying an Ecosystem Approach to the Regional Land use pilot

➢ **Utilitarian power:** It secures members' compliance through the appeal of various kinds of material and non-material rewards. The utilitarian power can by symbolized by incentives such as agri-environment schemes.

➢ **Normative power:** This is a system of control that is dependent on shared values that are generated by an organisation or the society and that are maintained. These values are diffused by cultural norms, education, advertising or propaganda. This kind of power emerges from organisations such as, amongst others, universities or conservation bodies that aim at raising people's awareness.

According to Reed et al. (2009), there are three sources of influence that include the personality, i.e. the leadership of a stakeholder, the property/wealth and the organisation. In this study, the influence of a stakeholder upon an ecosystem service has been defined to fit to the context and it can take different forms:

➢ **The use of an ecosystem service:** A stakeholder can have a strong influence upon a specific ecosystem service if it uses it and if this use affects the delivery of this one. For instance, industries consume large amounts of water for their activity, which could in turn affect water supply.

➢ **The legitimacy of an organisation:** for instance, Scottish Water has a statutory mission to provide water. Aberdeenshire Council gets its power directly from the government as a decentralized authority and is responsible for the provision of a range of public services. It is entitled and has the political influence to make decisions that can affect the delivery of Ecosystem Services;

➢ **The number of members:** the Royal Society of Protection of Birds for instance gets its power from the high number of over a million members that gives its voice more weight and that allow to reach, influence and be trusted by more people. Trust is generally a keystone of NGO's power (Ridder et al., 2005). Tourists and visitors may not harm the environment if there are not many of them; however, in highly frequented areas, their impact increases a lot;

➢ **The wealth of a stakeholder or its financial power (i.e. its resources)**: It can be either the ability of a stakeholder to buy a land, to buy or fund a service or its ability to influence other stakeholders' behaviour through the appeal of financial rewards. For instance, Aberdeenshire Council represents an umbrella organisation that gets its money for the government and is in charge of many sectors. It chooses how to use money and where to put it. For the moment, through the Regional Land Use Pilot project, it focuses on the delivery of ecosystem services and is thus likely to have a great influence on them;

➢ **The property rights of a stakeholder:** Owning a land gives a stakeholder a great influence on the delivery of Ecosystem Services. Depending on who owns the land and on what its goals are the Ecosystem Services that will be delivered will vary a lot. For instance, conservation bodies will own the land for protection and restoration purposes and will aim at restoring natural functions, thus promoting regulating or cultural services, whereas land managers will likely tend to promote provisioning services;

➤ **The interactions and relationship with other (influential) organisations:** Forming alliances with other stakeholders can give more weight to a stakeholder in the decision-making processes. Others can closely work with influential stakeholders such as the Joint Nature Conservation Committee that is associated with Natural Resources Wales, Northern Ireland's Council for Nature Conservation and the Countryside, Natural England and Scottish Natural Heritage. They also work with a range of conservation bodies, which provide them more labour and a larger scale of influence and action.

➤ **Their scale of action/influence:** Some stakeholder can affect large areas of land or water as for instance oil and gas industries. Their activities have an impact over a large scale and if there is oil spilling, the pollution can potentially affects aquatic ecosystems over wide extents.

The interest or stake of a stakeholder is often understood in a political sense (Eden & Ackermann, 1998; De Lopez, 2001; Bryson, 2004) as the level of concern, implication in a particular topic or organization. Pound describes interests as *"things that enhance quality of life and are desirable. They are actively sought"* (Pound, 2006: 20). In this study, interest can be defined as the dependency a person or an organization has on a particular ecosystem service for their economic security, health or well-being or as the mission a stakeholder is committed to fulfil. For instance, forestry industries depend on trees for their economic activity, while the Forestry Commission Scotland is committed to expand the woodland cover. In both cases, the interest in the provisioning service is high.

The next step consists in selecting the stakeholders that will be part of the grids. The stakeholder-ecosystem services matrix has been used in order to pick only the ones that have a relationship with the ecosystem services under consideration. This allows reducing the number of stakeholders to make the analysis clearer and simpler and to pinpoint only the most relevant ones that would have to be involved in decisions related to the delivery of these particular ecosystem services. This selection excludes automatically most of the remaining crowd, i.e. (1) all the potential crowd excluded after the sorting and grouping phases, as well as (2) the other stakeholders that are in the stakeholder-ecosystem Services matrix but have no relationship with the ecosystem service under consideration.

A colour has been ascribed to each sector, in order to make the grid more visual and to allow the reader to see which sector has more impact on each ecosystem service (see below). Some stakeholders belong to more than one sector; in these cases, the font colour has been changed to fit the colour code.

☐	Agriculture	☐	Forestry
☐	Biodiversity	☐	Marine
☐	Built environment	☐	Spatial planning and land use
☐	Business	☐	Transport
☐	Energy	☐	Water
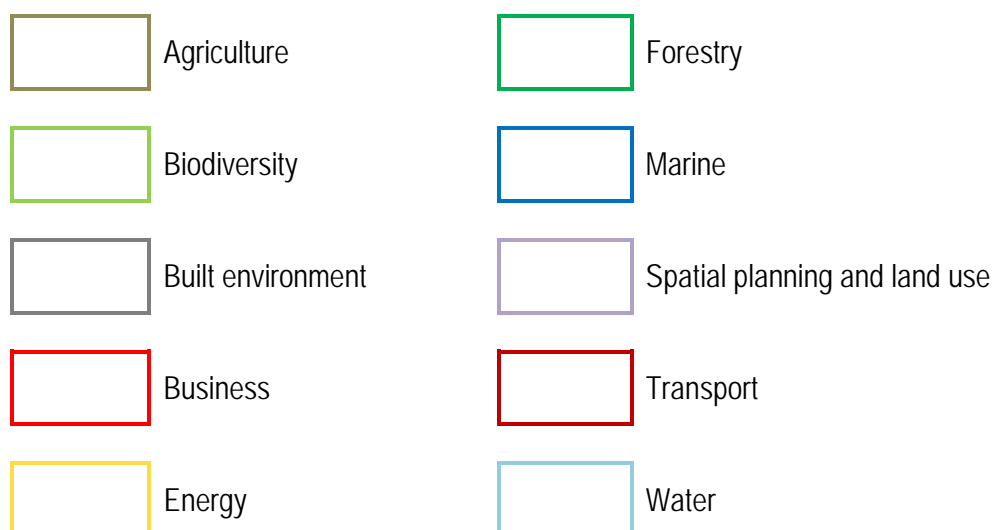
Then, stakeholders have been placed on the matrix according to their interest and their influence. It is tricky to assess if a stakeholder has more power than another or more interest, thus it has been decided to position them also in function of their direct or indirect relation with ecosystem services. Thus, when a stakeholder has a direct impact on an ecosystem service, it is considered as having a strong influence on an ecosystem service and is placed on the right of the grid, otherwise it is placed on the left. Likewise, when a stakeholder has a direct stake in an ecosystem service, it is positioned at the top of the matrix, otherwise at the bottom. What is important here is to be able to position the stakeholders in the four categories, rather than accurately weight their influence or their interest, which can be very variable.

When the stakeholders will be positioned into the matrices, it will allow us to highlight patterns in their distribution and identify the relationships between them and between the different professional sectors. Relations of competition, cooperation, similar interests or threat can be stressed thanks to these grids and allow us to think about the stakeholders with who to engage in order to reduce possible conflicts.

3. Thinking about applying an Ecosystem Approach to the Regional Land use pilot

This part is a reflection about the ability of the Regional Land Use Project to use an Ecosystem Approach for its regional framework. It questions the ability of established policies to integrate the principles of the Land Use Strategy and the Ecosystem Approach and to meet the objectives of the Land Use Strategy. This analysis also intends to see how the LUS and the RLUP integrate the principles of an Ecosystem Approach. To meet these objectives, several matrices have been created where the objectives and the principles of the LUS have been compared to the principles of the Ecosystem Approach, to the different policies and to all the relevant stakeholders selected previously (see Stakeholder analysis).

Ensuring the coherence between all of these principles, objectives and policies is essential as the RLUP will have to build on them and harmonize them. In addition, this part of the study corresponds to a step in a Strategic Environmental Assessment that aims at ensuring the internal and an external

coherence of the document under consideration. Here the goal is to see if the LUS and other policies have integrated the principles of the Ecosystem Approach and if the policies relevant to the Land Use Strategy include some of its principles and could contribute to meeting its objectives.

In addition to these matrices, an interest-influence grid has been created in order to classify stakeholders in relation to the implementation of the RLUP. They should help answer the questions related to "who's got the power to decide?" or "Are all the stakeholders equally empowered?"

Building the correspondence matrices

The construction of the matrices is based on information gathered in the policies, in the Land Use Strategy official documents and on the definition of the 12 Malawi principles of the Ecosystem Approach, as well as on our expert judgement. The procedure is simple and consists in ticking the cells where the two objects, whether principles, objectives or policies, being compared coincide.

There are several matrices that have been built:

➢ **Land Use Strategy Principles compared to relevant policies:** In this matrix, we aim at showing the policies that already integrate some of the LUS principles and which should be taken into account when they will be reviewed;

➢ **Land Use Strategy objectives compared to relevant policies:** This matrix aims at emphasising the policies that already contribute to meeting the objectives of the LUS and could help deliver the RLUP;

➢ **Land Use Strategy objectives compared to stakeholders:** This matrix aims at underlining the role of stakeholders in meeting the objectives;

➢ **Land Use Strategy Principles compared to (1) the three main principles of the Ecosystem Approach as described in the Land Use Strategy and with (2) the 12 Malawi Principles of an Ecosystem Approach:** These matrices intend to assess whether the Malawi Principles have been taken into consideration and diluted into the LUS;

➢ **Land Use Strategy objectives compared to the 12 Malawi Principles of the Ecosystem Approach:** This matrix aims at showing how meeting the objectives of the LUS will help deliver an Ecosystem Approach;

➢ **The three main principles of the Ecosystem Approach compared to the policies:** As we ran out of time for this part of the analysis, it has been decided to compare the policies to the main principles of an Ecosystem Approach and not to the 12 Malawi Principles. This aims at showing which policies already contribute to the delivery of an Ecosystem Approach and thus on which the RLUP should build on to apply an Ecosystem Approach;

➢ **The 12 Malawi Principles of the Ecosystem Approach compared to the 3 objectives of the LUS:** This matrix aims at highlighting how meeting the objectives of the LUS contributes to the Ecosystem Approach.

As we did not have the time to create a matrix comparing stakeholders to the 12 Malawi Principles, we decided to use an analogy stating that if a stakeholder helps meet the objectives of the LUS and if the

objectives of the LUS contribute to delivering the 12 Malawi Principles, then the stakeholder indirectly contributes to delivering the Ecosystem Approach.

Building the interest-influence grids

Considering the time remaining to conduct the study, it has been decided to work with the stakeholders that have been used for the stakeholder analysis. These ones represent only one part of the stakeholders, those mostly related to the ecosystem services delivery.

At the beginning of the study, it was planned to produce two grids, one linked to the RLUP and one linked to the Ecosystem Approach. However, we realised that creating an interest-influence grid of the Ecosystem Approach was not possible. Indeed, conversely to the Ecosystem Services which are relatively tangible, at least in terms of the goods that can be derived from them, and to the RLUP which is a project with clear boundaries, objectives and outcomes, the Ecosystem Approach is much more abstract and the terminology of 'interest' cannot be applied to it. Instead of interest we could use "potential for the EcA" (De Lopez, 2001), but due to the abstract nature of the Ecosystem Approach and the lack of clear objectives, it will be difficult to establish this potential. Furthermore, by definition, all stakeholders have a potential for involvement in the Ecosystem Approach as this one advocates involving all relevant stakeholders. By analogy, stakeholders interested in the Ecosystem Services might have a potential for working with the Ecosystem Approach. However, as the ecosystem services assessment represents only a minor part of the Ecosystem Approach[7], the stakeholders selected for this analysis do not include all the relevant stakeholders. However, if the potential cannot be clearly defined, it is still possible to assess the influence of stakeholders on the delivery of the Ecosystem Approach and this might be highlighted by the correspondence matrices.

The interest of a stakeholder in the delivery of the Regional Land Use Pilot project can be defined as the potential of stakeholders for the implementation of the regional framework and as the benefits they could get from it, especially in terms of reduction of conflicts. The influence is defined here as the contribution of a stakeholder to the delivery of the RLUP by using an Ecosystem Approach. By analogy, if the principles of an Ecosystem Approach are well integrated in the RLUP, the stakeholders that influence the RLUP indirectly influence the EcA. The influence can be of 3 different kinds, coercive, normative and utilitarian. The sources of power are almost the same as the ones used for the stakeholder analysis, with slight changes. Influence comes from:

➢ **The legitimacy of an organisation:** for instance, Aberdeenshire Council gets its power directly from the government as a decentralized authority and is responsible for the delivery of the RLUP. It is committed to take an Ecosystem Approach to produce it;

➢ **The number of members or spokespeople:** an organisation is likely to have more political weight if it counts a high number of members and thus can influence the way decisions over land management are made. In the context of the RLUP, these organisations can be invited to participate to meetings to give their opinion and influence the way the framework will be made. In addition, the more an organisation has members, the more members will be influenced by the project if the organisations gives its support to this one;

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[7] Ecosystem services are mentioned in principle 5 of the 12 Malawi Principles

- The wealth of a stakeholder or its financial power (i.e. its resources): It can be either the ability of a stakeholder to buy a land or to influence other stakeholders' behaviour through the appeal of financial rewards. In addition, it can also be the economic weight of a stakeholder through its activity. For instance, tourism represents a major source of income in Aberdeenshire and thus has to be considered in the regional framework as an important land use. This economic dimension should be taken into consideration as it is part of the principles of the LUS;

- The property rights of a stakeholder: Owning a land gives a stakeholder a great influence on how land will be managed. Their eagerness to be involved in the production process of the RLUP or to take it into account will be key to success of this project;

- The interactions and relationship with other (influential) organisations: Forming alliances with other stakeholders can give more weight to a stakeholder in the decision-making processes. Others can closely work with influential stakeholders such as the Dee Catchment Partnership that is associated with Aberdeenshire Council, the authority in charge of piloting the RLUP. Building on partnerships can ensure the success of the RLUP's delivery;

- Their scale of action/influence: Some stakeholders, such as land owners, can affect great extent of land. Ensuring that they are interested and involved in the RLUP and understand the issues at stake is likely to increase the chance of the project to succeed.

For this analysis, all the stakeholders have been placed on the grids, without sorting them, as they will all have a role to play in the delivery of the RLUP and indirectly the Ecosystem Approach. The method used for this part of the analysis is the same as the one used for the stakeholder analysis.

RESULTS AND DISCUSSION

1. Analysis of the main policy instruments affecting delivery of the ecosystem services

a. *Assessing the impacts on the ecosystem services*

A brief explanation of the impacts of the policies on some ecosystem services is provided below. This one aims at addressing the most problematic ecosystem services, for which the analysis required to make specific decisions and interpretation.

Supporting services

Concerning the **supporting services**, most effects have been considered as indirect (Figure 3). Indeed, all the negative impacts on ecosystem services are unintended and side effects of the policies aims, even if they can have an impact on some ecosystem services by sealing the soil for instance, which hampers the **soil formation** and **the nutrient cycling**.

In addition, in the case of the **soil formation**, this is a very slow process underpinned by a vast array of physical, chemical and biological interactions, thus there is no human activity that can really have a direct impact on it. To simplify the analysis, the soil formation has been considered as the topsoil formation only. This acts on a shorter time scale and only takes into account the first soil horizons where most of the interactions occur and that are the most likely to be affected by human activities and to affect other services such as regulating and provisioning services.

In this analysis, soil sealing is the main factor likely to have a negative impact on soil formation. It is mainly related to policies that promote an increase in the supply of houses or to growth of the cities for instance. Depending on the context, on the policy and on how it will be implemented, tillage can either have a negative effect by increasing erosion, contributing to soil capping and breaking the soil structure or a positive impact by improving the soil structure, creating a rough surface that help reduce erosion. The policy instruments that can influence soil formation are related to food security, urbanization or good farm practices, such as "Cross-compliance guide" or "National Planning Framework".

Policy document	Scale of application	Main objectives/aspirations or actions		Supporting services			
				Primary production	Water cycling	Soil formation	Nutrient cycling
Recipe for Success - Scotland's National Food and Drink Policy	Scotland	Support the growth of Scotland's food and drink industry		+	-	-	-
		Build on Scotland's reputation as a land of food and drink		0	0	0	?
		Ensure that people make healthy and sustainable choices		0	0	0	?
		Make Scotland's public sector an exemplar for sustainable food procurement		0	0	0	0
		Ensure Scotland's food supplies are secure and resilient to change		+	-	-	-
		Make food both available and affordable to all		+	0	0	0
		Ensure that Scottish people understand more about the food they eat		0	0	0	0
Whole Farm Review Scheme	Scotland - Farm scale	Improve the environmental and financial performance of the farmers		+	0	+	+
		Encourage farmers to measure their carbon footprint		0	0	0	0
Policy on Woodland Removal	Scotland	Criteria for determining the acceptability of woodland removal without a compensatory planting	To enhance priority habitats and their connectivity	0	0	0	0
			To enhance populations of priority species	0	0	0	0
			To enhance nationally important landscapes, designated historic environments and geological Sites of Special Scientific Interest	0	0	0	0
			To improve conservation of water or soil resources	0	0	+	0
			To contribute to public safety	0	0	0	0
		Criteria for determining the acceptability of woodland removal with a compensatory planting	To help Scotland mitigate and adapt to climate change	0	0	0	0
			To enhance sustainable economic growth or rural/community development	0	-	0	0
			To contribute to Scotland as a tourist destination	0	-	0	0
			To encourage recreational activities and public enjoyment of the outdoor environment	0	0	0	0
			To reduce natural threats to forests and other land	+	0	+	0
			To increase the social, economic or environmental quality of Scotland's woodland cover	0	0	0	0
Farming for a Better Climate	Scotland - Farm scale	Use energy and fuels efficiently		0	0	0	0
		Develop renewable energy		+	0	0	0
		Lock carbon into soils and vegetation		+	0	+	+
		Optimise the application of fertilisers and manure		+	0	0	0
		Optimise livestock management and the storage of waste (manure and slurry)		0	0	0	0

Figure 3: Part of the matrix illustrating the impact of four policy instruments on the delivery of supporting services

The **water cycle** corresponds to the various water fluxes that include rainfall, evapotranspiration and river flows as well as the major water storages composed of soil, lakes and groundwater. As for soil formation, the impacts of policy instruments on this ecosystem service are mostly indirect. The negative impacts are mostly related to urbanization that leads to soil sealing and is likely to hinder water drainage and to water abstraction from agriculture, industries or housing. The water cycle underpins the provisioning service "water supply"; therefore, if the water cycle is affected by human activities or decisions, it is likely that the water supply will be affected as well.

Several policy instruments, such as the "Scottish Planning Policy" and the "National Planning Framework" contain objectives that aim at providing a sufficient supply in homes that are likely to hinder the delivery of this supporting ecosystem service, by leading to soil sealing and an increase in water abstractions. Likewise, policies that encourage food security, such as "Recipe for Success - Scotland's National Food and Drink Policy", are likely to have unintended negative effects on the water cycle by leading to an increase in irrigation. Positive impacts can be achieved by amending environmental features, such as managing or restoring of wetlands and their natural functions. The Scottish Adaptation Framework for instance, has the objective to "promote restoration of natural processes and promotion of wetland networks in catchment as a means of increasing resilience", which should indirectly contribute to the delivery of this ecosystem service.

Primary production, which is the fixation by photosynthesis and the assimilation of carbon dioxide by plants (trees; flowers; crops; etc.) and algae, will very probably be indirectly affected by policy instruments that aim at increasing the woodland cover such as "Woods in and Around Towns", as well as by the policies that support the rural development and promote food security and thus crops growth such as "Recipe for Success: Scotland's Food and Drink Policy". It always is an indirect impact because the policies do not intend to improve the primary production but to increase crop yields, to produce more food or diversify farm activities, which generally indirectly affects positively the primary production.

Provisioning services

The **water supply** corresponds to the capacity of ecosystems to sustain water provision ecosystem service, that is to say the physical availability and the chemical character of water. This ecosystem services depends on the role of ecosystems in hydrologic cycles i.e. on the water cycle, but focuses mainly on the storage and the retention of water rather than on the flow of water through the system. The quality of water is mainly driven by the detoxification and purification abilities of soil and water. Ecosystem services associated with water supply relate to the consumptive use of water (by households, agriculture, industry), as well as the water available for the good functioning of ecosystems. Water supply is seen as a reservoir of good quality water that must be available for multiple uses.

Most of the impacts on this ecosystem service are indirect and correspond to unintended effects of objectives linked to the water resource. In addition, there are few policies that really focus on the water resource, whereas it is developing, thus it is normal to expect the impact to be indirect. The main part of the negative impacts could be ascribed to urban development, which is likely to increase the demand for water. The "National Planning Framework" as well as the "Scottish Planning Policy" are the main drivers for urbanization with objectives that directly advocate the increase in homes supply. This ecosystem service is the most negatively affected by policies and is likely to be at heart of conflicts in the future.

Wildlife species diversity has been kept separated in two columns because of two different aspects found in the matrix (Figure 4) – impact on cultural or provisioning services. The first one can be found in the Scottish Government Rationale for Woodland Expansion Cover, where the aspiration "Provide community benefits *(Provision of welcoming and well-managed woodlands in and around communities and where health and community is greatest)*" mainly refers to cultural services. Wildlife species

diversity in this case will provide goods that are linked to recreation, more than goods that are linked to bio prospecting or medicinal plants. Consequently, no impact has been assigned to the provisioning service. The other example can be found in the Cross-Compliance Guidance, with the aim "Minimum level of maintenance". Indeed, this objective indirectly affects the wildlife species diversity by maintaining hedges or copses for instance. However, as the policy mainly focuses on agriculture rather than on any recreational purpose, a positive indirect impact has only been assigned to the provisioning service.

Figure 4: One of the exception for the wildlife species diversity delivery

There are many policies that tend to have a positive impact on the delivery of this ecosystem service by promoting the conservation, the enhancement or the restoration of habitats, corridors or protected sites. Conversely, policy instruments that have adverse impacts on wildlife species diversity are mostly linked to urban development, including renewable energy fields, which is likely to fragment or destroy habitats.

Concerning the two other services, **"crops, livestock and fish"** and **"trees, standing vegetation and peat"**, the analysis is quite intuitive. The delivery of these ecosystem services is supported by policies that promote food security; improvement of farming practices; climate change mitigation or woodland cover expansion for various purposes. Most of the negative, i.e. unintended, effects are linked to the promotion of another activity that would compete with agriculture or forestry, such as urban development, renewable energy or forestry for arable lands.

Regulating services

Concerning the **regulating services**, most of the impacts of policy instruments are indirect because they are mainly achieved through indirect means or are side effects of specific actions on the environment. For instance, some policy instruments promote the protection of habitats and the restoration of habitat connectivity, such as the "Scottish Government's rationale for woodland expansion" or the "Scottish Biodiversity Strategy", which indirectly and positively contribute to

pollination, to **pest and disease regulation**, to the **detoxification and purification functions of soil, air and water** and sometimes to **noise regulation**.

The unintended negative impacts on regulating services are most of the time linked to policies promoting urban development, such as National Planning Framework or Scottish Planning Policy, as they contribute to damaging or fragmenting natural habitats responsible for the provision of regulating services. However, we do not know how the new SPP and the new NFP will look like and which specific measures they will contain. In addition, the negative impacts of these policy instruments this can be balanced by policies such as "Woods In and Around Towns", which aim at providing a healthier and greener urban environment for the benefits of all. Green corridors within and around towns are likely to contribute to the delivery of regulating services such as air purification or noise regulation, and thus to the delivery of multiple benefits.

Climate regulation can be affected by various policy instruments as there are many processes including many factors that are involved in this ecosystem service (Figure 5). Indirect negative impacts are mainly caused by urban development such as city growth. The National Framework Planning and the Scottish Planning Policy advocate the increase in homes supply, which could over time contribute to increasing the Green House Gas emissions. However, both support the Scottish Government's aspirations regarding the expansion of the forest cover, which is likely to affect climate regulation by sequestering carbon. Indirectly, policies that aim at reducing greenhouse gas emissions, such as the National Planning Framework, that promotes the shift towards more sustainable patterns of travels, transport and land use will have a positive impact on climate regulation, as well as policies that promote renewable energy.

Policy document	Scale of application	Main objectives/aspirations or actions	Primary production	Water cycling	Soil formation	Nutrient cycling	Crops, livestock, fish	Trees, standing vegetation, peat	Water supply	Wild species diversity	Wild species diversity	Environmental settings	Climate regulation	Pollination	Detoxification and purification in soils, air and water	Hazard regulation	Noise regulation	Disease and pest regulation
			Supporting services				**Provisioning services**				**ltural serv**		**Regulating services**					
Low Carbon Scotland: Meeting the Emissions Reduction Targets 2013-2027	Scotland	Energy supply: Provide secure and low carbon energy supply for the long term and decarbonise supply: reduce the GHG emissions, reduce energy demand, increase energy efficiency, promote renewable energy	0	-	0	0	-	+	0	0	0	-	+	0	0	0	0	0
		Homes and communities: Reduce the direct emissions from homes through preventing heat loss, increasing the efficiency of the heating systems, using energy intelligently and by substituting renewable fuel sources for fossil fuels	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
		Business and the Public Sector	0	0	0	0	0	+	+	0	0	0	+	0	0	0	0	-
		Transport: reduce road transport emissions and widen the choice in low carbon modes of travel available to individuals	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
		Rural Land Use: reduce GHG emissions, improve the efficiency and the diversity of farmers' businesses, manage the land in a way that it protects the existing carbon storage and that it locks away CO2, ensure that agriculture remains productive and competitive while contributing to climate change targets	+	0	+	+	+	+	?	0	0	+	+	0	+	+	0	0
		Waste:	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
The Scottish Forestry Strategy	Scotland	Using forestry, and adapting forestry practices, to help reduce the impact of climate change and help Scotland to adapt to its climate change	+	0	0	0	-	+	0	0	0	-	+	0	0	0	0	+
		Getting the most from Scotland's increasing and sustainable timber source	+	0	0	0	-	+	0	0	0	-	0	0	0	0	0	-
		Strengthening forestry through business development to underpin sustainable forest management and support economic growth and employment across Scotland	0	0	0	0	0	+	-	0	0	+	0	0	0	0	0	0
		Improving the quality of life and well-being of people by supporting community development across Scotland	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0
		Making access to, and enjoyment of, woodlands easier for everyone to help improve physical and mental health in Scotland	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0
		Protecting the environmental quality of our natural resources (water, soil and air), contributing to and improving our scenery, and helping to make the most of our unique historic environment	0	0	+	+	0	+	0	0	0	+	0	0	+	+	+	0
		Helping to restore, maintain and enhance Scotland's biodiversity, and increasing awareness and enjoyment of it.	0	0	0	0	0	+	0	+	+	+	0	+	0	0	0	+

Figure 5: Examples of policies which aim at tackling climate change

It is likely that more and more policies will affect the delivery of this ecosystem services as climate change mitigation and adaptation becomes more embodied into them. In the list of relevant policies, 15 of them include objectives aiming at mitigating, or adapting to, climate change and act more or less indirectly on the delivery of climate regulation. They combine strategies that intend to sequester carbon; change people's behaviour; adapt infrastructure; save energy and shift towards renewable energy. Some of these strategies can affect the delivery of other ecosystem services, such as woodland expansion that would be realised in detriment to arable lands, or implementation of wind farms that could affect the environmental settings. The RLUP should build on these instruments as the purpose of the LUS was initially to tackle climate change issues through a better land use management[8].

Cultural services

The **environmental settings** have become an important part of the policies and there are many of them who have include objectives directly related to their management. Amongst the 29 policy instruments analysed, 17 of them affect positively and directly the delivery of this ecosystem service. The objectives are most of the time linked to the protection and the enhancement of the natural and cultural environment as well as the landscapes. For instance, the "SNH - Strategic Locational Guidance for Onshore Wind farms in respect of the Natural Heritage" and the "European Landscape Convention, 2000" have a direct positive impact on the environmental settings as they help preserve or enhance their quality.

As for most of the ecosystem services, policies that tend to affect negatively the environmental settings are the ones that promote urban and renewable energy development. In addition, woodland expansion for forestry purposes, which could lead to forest monocultures, with a strong visual impact on environmental settings that can hinder the quality of the landscapes. This can also be balanced by the policy on woodland removal that advocates proceeding to woodland removal "to enhance nationally important landscapes, designated historic environments and geological Sites of Special Scientific Interest" and thus contributing positively to the environmental settings. The Scottish Outdoor Access Code has a direct positive effect on the environmental settings as it is committed to safeguard the access to green spaces.

b. Classifying the policies

Based on the impacts of the policies on the delivery of ecosystem services, it appears that there are four different types of documents that stand out of this analysis:

- ➢ **8 strongly supportive or Supportive policies:** When looking at the matrix, supportive policies are policies that tend to affect directly positively the delivery of ecosystem services. These policies are: Farming for a Better Climate; Cross-Compliance Guidance; Scottish Historic Environment Policy; Scottish Biodiversity Strategy; SNH - Strategic Locational Guidance for

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[8] Read Climate Change (Scotland) Act 2009 – Part 5 Chapter 2

Onshore Wind farms in respect of the Natural Heritage; Scottish Soil Framework; The Right Tree at the Right Place; Woods In and Around Towns (Figure 6);

Policy document	Scale of application	Main objectives/aspirations or actions	Supporting services				Provisioning services			Cultural services			Regulating services					
			Primary production	Water cycling	Soil formation	Nutrient cycling	Crops, livestock, fish	Trees, standing vegetation, peat	Water supply	Wild species diversity	Wild species diversity	Environmental settings	Climate regulation	Pollination	Detoxification and purification in soils, air and water	Hazard regulation	Noise regulation	Disease and pest regulation
Woods in and Around Towns	Scotland - Urban areas	Deliver a wide range of social, economic and environmental benefits for Scottish society	+	0	0	0	0	+	0	+	+	+	+	+	+	+	+	0

Figure 6: An example of a supportive policy of the delivery of ecosystem services

> **7 indirectly supportive:** Policies that are indirectly supportive of the delivery of ecosystem services are policies whose impacts are mostly positively indirect, either because they are unintended, or because they imply one causal mechanism. For instance, the Water Environment and Water Services (Scotland) Act 2003 is effective through the implementation of more operational documents such as River Basin Management Plan. These policies are: Whole Farm Review Scheme; Wildlife and Natural Environment (Scotland) Act 2011; The Water Environment and Water Services (Scotland) Act 2003; Flood Risk Management (Scotland) Act 2009; Nature Conservation (Scotland) Act 2004; European Landscape Convention, 2000; Marine (Scotland) Act 2010 (Figure 7);

Policy document	Scale of application	Main objectives/aspirations or actions	Supporting services				Provisioning services			Cultural services			Regulating services					
			Primary production	Water cycling	Soil formation	Nutrient cycling	Crops, livestock, fish	Trees, standing vegetation, peat	Water supply	Wild species diversity	Wild species diversity	Environmental settings	Climate regulation	Pollination	Detoxification and purification in soils, air and water	Hazard regulation	Noise regulation	Disease and pest regulation
Flood Risk Management (Scotland) Act 2009	Scotland	Sustainable flood management	0	+	0	0	0	+	0	0	0	0	0	0	0	+	0	0
Nature Conservation (Scotland) Act 2004	Scotland	Protect and enhance the natural environment, including wildlife and biodiversity	0	0	0	0	0	+	0	+	+	+	0	+	0	0	0	0

Figure 7: An example of an indirectly supportive policy of the delivery of ecosystem services

> **6 very indirect or neutral policies:** These policies mostly do not have impact on the delivery of ecosystem services. These ones are: Scottish Outdoor Access Code; Scottish Adaptation Framework; Pollution Prevention and Control (Scotland) Regulations 2012; Crofting Reform (Scotland) Act 2010; A Low Carbon economic Strategy for Scotland; Low Carbon Scotland: Public Engagement Strategy (Figure 8);

Policy document	Scale of application	Main objectives/aspirations or actions	Supporting services				Provisioning services				Cultural services		Regulating services					
			Primary production	Water cycling	Soil formation	Nutrient cycling	Crops, livestock, fish	Trees, standing vegetation, peat	Water supply	Wild species diversity	Wild species diversity	Environmental settings	Climate regulation	Pollination	Detoxification and purification in soils, air and water	Hazard regulation	Noise regulation	Disease and pest regulation
A Low Carbon economic Strategy for Scotland	Scotland	Sustainable and resource-efficient businesses	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
		Sustainable and competitive industries	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
		Supporting the right innovative low carbon technologies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Funding technological innovation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Securing funding and de-risking investment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Develop world leading policy frameworks and create a comprehensive infrastructure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Moving towards a low carbon built environment	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
		Exploiting and integrating low carbon building technologies into the design and construction process	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
		Promoting low carbon building design at all scales from neighbourhood upwards	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
		Reducing the need for travel	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
		Widening travel choice	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0
		Encouraging both energy efficient driving and supply chains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		The development and uptake of emerging technologies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Setting a policy and regulatory framework	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 8: An example of a neutral policy

> **9 ambiguous policies:** These policies are policy instruments whose effects are mixed and where positive impacts and negative impacts offset each other. Some of these policies could have very negative effects on the environment if they did not include other objectives that act as mitigation measures and outweigh these negative impacts. These documents are the most interesting in the context of the RLUP as they tend to be more integrated and correspond for the most part to the keystones of the policy framework for land use. They are: National Planning Framework 2; The Scottish Government's rationale for woodland expansion; Recipe for Success - Scotland's National Food and Drink Policy; Policy on Woodland Removal; Our Rural Future; Scottish Planning Policy 6; Low Carbon Scotland: Meeting the Emissions Reduction Targets 2013-2027; The Scottish Forestry Strategy; National Marine Plan (Figure 9).

Policy document	Scale of application	Main objectives/aspirations or actions	Supporting services				Provisioning services				Cultural serv		Regulating services					
			Primary production	Water cycling	Soil formation	Nutrient cycling	Crops, livestock, fish	Trees, standing vegetation, peat	Water supply	Wild species diversity	Wild species diversity	Environmental settings	Climate regulation	Pollination	Detoxification and purification in soils, air and water	Hazard regulation	Noise regulation	Disease and pest regulation
National Planning Framework 2	Scotland	Support strong, sustainable growth for the benefits of all parts of Scotland	0	-	-	-	0	+	-	-	+	+	?	0	0	-	+	0
		Promote development which helps reduce Scotland's carbon footprint and facilitates adaptation to climate change	0	0	0	0	0	+	0	0	0	0	+	0	+	+	0	0
		Support the development of Scotland's cities as key drivers of the economy	0	-	-	-	0	0	0	0	0	+	?	0	+	-	0	0
		Support sustainable growth in rural areas	+	+	+	+	+	+	-	0	0	+	+	0	0	0	0	0
		Conserve and enhance Scotland's distinctive natural and cultural heritage and continue to safeguarding internationally protected sites, habitats and species	0	0	0	0	0	+	+	+	+	+	+	+	+	+	+	+
		Expand opportunities for communities and businesses by promoting environmental quality and good connectivity	0	0	0	0	0	0	0	0	?	?	0	0	?	0	0
		Promote development which helps to improve health, regenerate communities and enable disadvantages communities to access opportunities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Strengthen links with the rest of the world	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Promote more sustainable patterns of travel, transport and land use	0	0	0	0	0	0	0	0	0	0	+	+	0	0	0	0
		Realise the potential of Scotland's renewable resources and facilitate the generation of power and heat from clean, low carbon sources	0	0	0	0	-	+	0	0	0	+	+	0	+	+	+	0
		Encourage a sufficient supply of homes which are affordable in places where people want to live	0	-	-	-	0	-	-	-	-	-	0	0	-	0	0
		Facilitate the implementation of the National Waste Management Plan including waste management targets	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 9: An example of an ambiguous policy

As we can see, the policies are quite evenly distributed and this can be ascribed to the fact that it was a very heterogeneous lot, including very strategic documents as well as more operational documents. In the context of an ecosystem assessment, the list of policy instruments relevant to the Land Use Strategy provided by the Scottish Government does not seem completely pertinent as there are almost half of them that are indirectly supportive of the delivery of ecosystem services or even neutral. There are indeed more operational documents that should be taken into consideration such as River Basin Management Plans, local urban plans or future local flood risk plans as the relationship of the regional framework with the statutory planning system is a key issue. These plans should be included since the beginning to be able to integrate their objectives and targets and ensure a spatial coherence with them and policies relevant to land use.

Aberdeenshire Council could deliberately choose to take them into consideration, even more if it aims at creating a framework that "expresses regional and local policies relevant to land use" (Scottish Government, 2013). For each Act or very strategic document, there should be a more operational document translating their intention at a local scale to consider and use for the baseline mapping. As they would be locally tailored, they should be more operational and thus they would likely be either strongly supportive or ambiguous. This would reflect more the kind of policy the regional framework would look like as it will help articulate the local aspirations of the policies to optimise the use of the land and reduce the conflicts.

It is important to note that some of the documents might not be relevant in the context of the delivery of ecosystem services, such as the neutral or indirectly supportive documents, but this does not means they are not relevant in the context of an Ecosystem Approach. Indeed, some policies have a strong focus on stakeholders' engagement such as "Low Carbon Scotland: Public Engagement Strategy" or the "Scottish Outdoor Access Code" and fit perfectly in the context of the Ecosystem Approach and the RLUP that seek the maximum involvement of local stakeholders.

In addition, this is not because a document is not related to the provision of ecosystem services that it does not help protect the environment. Some of them could act directly on the "load" of pollutants for instance. Reducing the amount of pollutants contributes to a healthier environment but does not imply any service to detoxify either the soil or the air.

The policies supportive or very supportive of the delivery of ecosystem services are generally policies that are very oriented towards the protection of cultural and natural heritage and that have a strong focus on the environmental dimension. Some have already integrated the concept of ecosystem services or benefits, such as Woods In and Around Towns, and others aim at guiding and influencing people's behaviour towards more sustainable practice that would maintain or restore natural functions and thus support the provision of ecosystem services.

Policy instruments that are indirectly supportive of the delivery of ecosystem services or neutral are for most of them very strategic documents, such as acts, reforms, codes or documents aiming at changing people's behaviour. These policies generally have a wide scope but meeting their targets takes more time. They usually need to be downgraded into a more operational document to have an impact on

ecosystem services, thus it would be interesting to look at this kind of document when designing the strategic framework of the Regional Land Use Pilot.

Ambiguous policies are instruments that usually try to integrate the three pillars of sustainability. Indeed, they almost all tend to address multiple issues by setting multiple objectives and targets and include a strong economic dimension, which stands along environment and community dimensions. Objectives that aim at protecting or enhancing the natural and cultural heritage or at mitigating or adapting to climate change act as mitigation measures to balance the potential adverse effects of the economy-oriented objectives. In particular, we can target planning-oriented policies such as National Planning Framework 2 or Scottish Planning Policy 6, which both support a strong economic growth and encourage a sufficient supply of homes. If these objectives tend to support the economy and the communities, they can strongly negatively affect the delivery of ecosystem services by sealing the soil; emitting carbon; hampering drainage; disrupting natural functions such as nutrient cycling or detoxification and purification functions of the soil and altering the environmental settings. However, both of these policies include objectives that intend to conserve and enhance Scotland's distinctive natural and cultural heritage for the enjoyment for everyone or to reduce the carbon emissions by transforming the transport or the housing sector.

It is important to consider that growth is inevitable and that demographic change will have a strong negative impact on the delivery of ecosystem services and the way planning will be done in the future. Policies will necessarily have to integrate an economic dimension, support industries and plan for the provision of public services; food; water and sufficient homes for future inhabitants. The most important is to advocate mitigation measures within the policy that will either reduce the negative impacts, or compensate the losses. For instance, increase growth and development of rural areas will lead to an increase in energy demand, but this can be balanced by other policies and orientations on low carbon economy and climate change mitigation, which promote renewable energy and energy efficiency.

Water supply is one the most negatively affected ecosystem services, especially by food security and economic growth orientations, and will likely be at heart of many conflicts in the future since it supports many activities and since the demand is likely to rise due to the predicted 18% population increase in Aberdeenshire. In the workshop about the Ecosystem Approach and the Regional Land Use Pilot held on 28th June 2013 in Banchory, participants have shared their concern about the provision of this ecosystem service and advocated that there should be more planning to anticipate the future demand that will emerge from further industrial and housing development. Hence, the RLUP will have to pay a particular attention to this ecosystem service.

Supporting services are also often indirectly affected by ambiguous policies, especially by urban development oriented objectives that could lead to soil sealing and thus hinder water drainage and soil formation and nutrient cycling processes.

The impacts of the different policies on climate regulation is mostly ambiguous as it is hard to predict the balance that will be found between climate mitigation oriented objectives and economic growth oriented objectives that may lead to an increase of greenhouse gas emissions.

As the Regional Land Use Pilot framework is committed to include most of the targets set in the present policies and to take into considerations all relevant sectors for land use, it is likely to become an

ambiguous policy and there is a need to recognize that hard trade-offs cannot be avoided. Consequently, it should contain mitigation measures to reduce the adverse effects that the Strategic Environmental Assessment will have highlighted.

In the context of ecosystem services, the trade-offs should not only be made in function of economic considerations but also in function of human well-being and climate mitigation targets as the Land Use Strategy fall within the Climate (Scotland) Act 2009 requirements.

c. Analysis of the complementarities and the conflicts

Comparison of the objectives of the ambiguous policies

When looking at the table, it appears that almost half of the policies are synergistic and that a bit more than half of them are potentially synergistic and conflicting (Figure 10). There does not seem to be very conflicting objectives between the policies and they seem to be well correlated when they are looked at from a strategic point of view.

The "Scottish Forestry Strategy", the "Scottish Government's rationale for woodland expansion" and the "policy on Woodland Removal" are part of the same strategy and are therefore strongly synergistic. Their objectives perfectly coincide and include the three pillars of sustainability by promoting sustainable economic growth, supporting community development and protecting the environment and the benefits derived from it.

All the policies selected for this study and for the RLUP are synergistic on climate change mitigation and regulation and seem to support the Scottish Government strategies to tackle climate change. They are well correlated with the Low Carbon Scotland Strategy and are committed to contribute to meeting the emissions reduction targets. As a consequence, they can contribute to the delivery of the Land Use Strategy objectives. These policies are generally committed to reduce greenhouse gas emissions through various strategies, and it is these differences that will change the way policies impact the delivery of ecosystem as their translation into practice might be very different. Consequently, their implementation can be more conflicting.

Most of these policies, except "Our Rural Future", the "National Food and Drink Policy" and the "National Marine Plan", support the Scottish Forestry Strategy and the afforestation targets set up by the Scottish Government and include objectives that should lead to meeting these targets. Woodland expansion objectives are often linked climate change mitigation and adaptation objectives.

Policy Document	National Planning Framework 2	The Scottish Government's rationale for woodland expansion	Recipe for Success - Scotland's National Food and Drink Policy	Policy on Woodland Removal	Our Rural Future	Scottish Planning Policy 6	Low Carbon Scotland: Meeting the Emissions Reduction Targets 2013-2027	The Scottish Forestry Strategy	National Marine Plan
National Planning Framework 2		C/S	C/S	S	S	S	C/S	C/S	C/S
The Scottish Government's rationale for woodland expansion	C/S		C	S	C/S	C/S	C/S	S	S
Recipe for Success - Scotland's National Food and Drink Policy	C/S	C		S	S	C/S	C/S	C/S	C/S
Policy on Woodland Removal	S	S	S		S	S	C/S	S	C/S
Our Rural Future	S	C/S	S	S		S	C/S	C/S	S
Scottish Planning Policy 6	S	C/S	C/S	S	S		C/S	C/S	S
Low Carbon Scotland: Meeting the Emissions Reduction Targets 2013-2027	C/S	C/S	C/S	C/S	C/S	C/S		C/S	S
The Scottish Forestry Strategy	C/S	S	C/S	S	C/S	C/S	C/S		S
National Marine Plan	C/S	S	C/S	C/S	S	S	S	S	

Figure 10: Complementarities and conflicts matrix of the objectives of the 9 ambiguous policies

Overall, all of these policies are committed to protect and enhance the natural and the cultural heritage as well as landscapes and some also aim at promoting the enjoyment of the outdoor environment. The NPF2, for instance, recognises the benefits forests can bring to the communities and to urban environment and there seems to be a growing acknowledgment of the benefits nature can bring to the society. It is increasingly embodied in policies, especially those linked to forestry. The RLUP can build on their objectives to help maximise the delivery of ecosystem services

Another recurrent theme that appears in the objectives of many policies is the growth and the development of rural areas. NPF2 recognises the importance of rural areas for economy; tourism; food production; renewable energy production and communities' well-being and is committed to realise its full potential. Its objectives work in concert with the objectives of "Our Rural Future"; the "Scottish Planning Policy"; the "Policy on Woodland Removal" and "Low Carbon Scotland". Rural areas are likely to represent key areas for the implementation of the regional framework as they are at the heart of conflicting land uses and policy objectives. Indeed, they should contribute to food security e.g. "National Food and Drink Policy"; to support tourism e.g. "National Marine Plan"; to achieve the objectives of carbon reduction e.g. "Low Carbon Scotland" and to improve communities' health and well-being "Our Rural Future" and thus there will be a need to make trade-offs.

Comparison of the impacts of policies on ecosystem services

Overall, when the impacts of policies on ecosystem services are compared, it appears that they are neither synergistic nor conflicting but mixed (Figure 11). Considering that the policies already include

conflicting objectives and conflicting impacts on the ecosystem services, as they have been classified in the "ambiguous" category, this result was predictable.

If we proceeded ecosystem service by ecosystem service, policy by policy, it is likely that we would have very different results and we would see more clearly some patterns in the complementarities and conflicts. However, for this we would have to look at a higher level of details, which was not possible considering the time available for this study. For this study, we decided to take a more systemic approach, which is relevant in the context of an Ecosystem Approach, comparing the impacts of a policy on the entire ecosystem to the impacts of another policy document. It allows us to see that the overall impact of a policy, or of a combination of policy targets, is likely to be mixed. Indeed, the effects on the delivery of ecosystem services of the policies are likely to balance each other and it is necessary to look at the whole painting to get an accurate view of the final impact.

Policy Document	National Planning Framework 2	The Scottish Government's rationale for woodland expansion	Recipe for Success - Scotland's National Food and Drink Policy	Policy on Woodland Removal	Our Rural Future	Scottish Planning Policy 6	Low Carbon Scotland: Meeting the Emissions Reduction Targets 2013-2027	The Scottish Forestry Strategy	National Marine Plan
National Planning Framework 2		C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S
The Scottish Government's rationale for woodland expansion	C/S		C/S	S	C/S	C/S	C/S	S	C/S
Recipe for Success - Scotland's National Food and Drink Policy	C/S	C/S		C/S	C/S	C/S	C/S	C/S	C/S
Policy on Woodland Removal	C/S	S	C/S		C/S	C/S	C/S	S	C/S
Our Rural Future	C/S	C/S	C/S	C/S		C/S	C/S	C/S	C/S
Scottish Planning Policy 6	C/S	C/S	C/S	C/S	C/S		C/S	C/S	C/S
Low Carbon Scotland: Meeting the Emissions Reduction Targets 2013-2027	C/S	C/S	C/S	C/S	C/S	C/S		C/S	C/S
The Scottish Forestry Strategy	C/S	S	C/S	S	C/S	C/S	C/S		C/S
National Marine Plan	C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S	

Figure 11: Complementarities and conflicts of the impacts on ecosystem services of the 9 ambiguous policies

The only policies likely to be perfectly synergistic are policies linked to the forestry strategy, "Scottish Forestry Strategy", "Rationale for Woodland Expansion" and "Policy on Woodland Removal", as they tend to deliver the same outcomes. They contribute to the delivery of regulating services such as climate regulation or detoxification and purification in air, soil and water, and to provisioning services, in particular "trees, standing vegetation and peat". As most of the 9 policies analysed here support the afforestation strategy and have objectives that coincide with the objectives of the 3 forestry policies, it is likely that they will contribute to the delivery of these ecosystem services as well. However, these policies usually have a negative impact on the delivery of "crops, livestock and fish" and thus are in conflict with policies such as the "National Food and Drink Policy" that strongly supports the delivery of the former.

The impact of the 9 ambiguous policy instruments on the delivery of supporting services is mostly indirect and potentially conflicting and synergistic. Indeed, these policies contain objectives linked to the protection of the natural heritage, to food production or to tree planting, which are likely to affect positively the primary production. Objectives linked to protection of the environmental quality can indirectly play a role on soil formation, water cycle and nutrient cycle. However, some of these policies, such as NPF2 and SPP6, which represent the keystones of planning development, promote urban development, in particular a sufficient homes supply. Therefore, the impacts of their objectives are indirectly negative on the delivery of supporting services and are conflicting with the positive effects emerging from the protection of the natural heritage.

Overall, the delivery of provisioning services is very conflicting between policies but also within a policy. Supporting the delivery of "crops, livestock and fish", is likely to be conflicting with the delivery of "trees, standing vegetation and peat" and "water supply", as well as on "wildlife species diversity", "climate regulation" and some supporting services. Hence, "Our Rural Future", the "National Food and Drink Policy" and other policies that support food production through rural development are likely to be competing with policies supporting afforestation and protection of the environment, and to be conflicting with each other. Water supply is usually a cause of conflicts between policies as it can be affected by multiple land uses.

Concerning the cultural services, a balance will have to be found between protection and the enhancement of the environment and urban development including houses; infrastructures; roads or renewable energy. Some policies, such as the "SNH Guidance on the implementation of wind farms", can help decision-makers make appropriate decisions regarding the protection of the natural and cultural heritage. Some sites will have to be "sacrificed" for the sake of development or climate change mitigation, and decisions over land use are "matter of societal choices" (CBD, 1992). This means that decision-makers and policy-makers should seek to take into account local communities' interests. Wildlife species diversity and environmental settings represent crucial aspects of an Ecosystem Approach and they must be recognized in the regional framework in order to guide ecosystem management.

The regulating services are usually affected in an indirect way by policies. Thus, as they correspond to unintended effects, either "bonus" impacts or negative side effects, they are likely to lead to conflicts because they are   not the primary targets of the policies Indeed, the improvement of regulating services' delivery is mostly the result of environment protection or afforestation strategies, with no specific targets. Conversely, negative effects emerge from habitats' destruction or fragmentation. Some synergies can however be observed between policies on climate regulation even though conflicts could arise from urban development oriented objectives.

d.   Summary and recommendations emerging from the policy analysis

Four different types of policies were identified according to their impact on ecosystem services. The differences are related to the heterogeneity of the policies contained in the list of policy instruments to analyse. The policies address two different levels:

- One very strategic level, where policies outline overall goals and principles. Policies on this level have indirect or neutral impacts on the delivery of ecosystem services. They contribute to either setting a vision or guideline or to establish favourable conditions for the delivery of ecosystem services. These policies are not relevant in the context of an ecosystem services assessment. However, they should be taken into consideration in the context of an Ecosystem Approach as they can contribute to its delivery. Aberdeenshire Council should look at the policies that represent the local and operational counterpart to the more strategic policies;

- One operational level, where policies can be either supportive of ecosystem services' provision or ambiguous and could have negative impact on ecosystem services unless they include mitigation measures. These policies are directly relevant in the context of an ecosystem services assessment and should be the focal point for the policy mapping of the RLUP.

Provisioning and cultural services are the most directly affected ecosystem services, while supporting and regulating services are mostly indirectly affected. Therefore, great care should be taken to consider these two services as they are likely to be affected by decisions targeting provisioning or cultural services. Another ecosystem service that should be carefully assessed is water supply as it is likely to become subjects to increasing conflicts in the future. In addition, it is necessary to consider more operational documents, such as RBMP that include a strong water dimension and are likely to influence the delivery of this ecosystem service.

The delivery of ecosystem services will be a matter of balance and trade-offs and thus, what counts is not to understand how each ecosystem service will be affected by each policy, but rather to understand how policies' objectives and impacts offset each other. Thanks to the complementarities/conflicts matrices, we can identify some well-known conflicting land uses that will require making trade-offs such as "food security vs. forest expansion"; "development of renewable vs. landscapes"; "development of renewables vs. food security or forest expansion"; "development renewables vs. transport". The RLUP will have to pay attention to these trades-offs and plan for mitigation measures. In addition they will need to involve stakeholders in the decision making and include equity aspects in the decision making process in order to stay true to the principles implied by an Ecosystem Approach.

Participants of the Banchory workshop argued that the RLUP should not be prescriptive, but rather informative. The public sector may have a statutory duty to 'have regard' to the final regional land use framework, to be produced at the end of the RLUP 2014-15, but it will remain as a voluntary decision aid for land managers and developers. In order for the tool to be used, the stakeholders will have to understand and support the principles behind the framework and see the relevance to their land use planning processes. This is the only way to ensure that the RLUP will have an effective influence on the way land is managed.

This analysis provides a first insight into the impacts of policies on ecosystem services. This can be used to understand the potential consequences of policies on ecosystem services in phase one of RLUP where policies and environmental assets will be mapped and overlaid with each other.

One strong message to remember is that an Ecosystem Approach is not limited to an ecosystem services assessment and thus, it is important to look at all the objectives of the policies understand how they fit with an Ecosystem Approach and how they contribute to its delivery. Analysing to what degree

indirect or neutral policies meet the Malawi principles could help think about how they may or may not contribute to the overall strategy of the RLUP and how to use them to meet the LUS objectives (see Analysis of the correspondence between the Regional Land Use Pilot, the Ecosystem Approach, the policies and the stakeholders).

e. *Challenges and limitations of the policy analysis*

The list of policies analysed here has been created by the Scottish Government as those which should be taken into account by the RLUP. However, they may not perfectly reflect and encompass all the relevant sectors for the Land Use Strategy. Indeed, surprisingly the list contains neither the Common Agricultural Policy nor the Scottish Rural Development Plan, which represent key instruments for the management of rural areas. Indeed, the CAP sets up the vision for the management of these areas. The SRDP is a programme of economic, environmental and social measures that aims at supporting the development of rural Scotland. As stated earlier, rural areas are at the heart of the LUS and the RLUP should take into account the objectives of the CAP and the SRDP if it wants to be fully comprehensive and coherent. During the workshop held at Banchory on June 28th, participants highlighted the importance of these documents and showed their concern about how they will develop in the future and how they will influence the way land is managed. For participants, CAP and SRDP represent key policy instruments and they wondered how much influence the RLUP would have considering the weight of the CAP on rural areas and thus on the delivery of ecosystem services. For this study, we decided to stick to the list of policies listed as relevant by the Scottish Government but the analysis may suffer from this lack.

In addition, the list is composed of very heterogeneous policy instruments, including some that neither clearly state the objectives or aims, nor the way these should be met. This has complicated the study because it required analysing them as a whole and defining the objectives ourselves. Determining the aim of policy instrument and their impact on ecosystem services was in these cases a matter of interpretation based on our expert opinion. Indeed, another person reading the policy might have interpreted it very differently. This has implications not only for an analysis such as this but also for the implementation of these policies which will likewise be based on how they are interpreted by those responsible for the implementation. Depending on how these strategic policy instruments are interpreted and consequently implemented can lead to conflicts which cannot be foreseen by looking at the strategic policy documents alone. Hence, it is advisable to focus on more operational policies where there is less risk of misinterpreting the way the policy instruments are going to influence the delivery of ecosystem services.

Overall, there are neither guidelines to analyse the impact of policies on the delivery of ecosystem services, nor indicators to assess the success of this study. All the decisions have thus been based on our expert opinion. This is influenced by our knowledge and experience and varies a lot between people. Therefore, there could have been many different ways of conducting the study and addressing the issues linked to a qualitative analysis. For this study, we have chosen to use a matrix to compare each policy with each ecosystem service and we have analysed the policies by using their objectives. In the context of an Ecosystem Approach, where the key word is system, this method may not be the most appropriate to capture the complexity of the ecosystem services' delivery. However, as everything is strongly intertwined, we need a way to simplify the analysis and to disentangle all the components of

the analysis. Analysing a whole system is indeed much more complicated and as the matrix on complementarities and conflicts of the impacts on ecosystem services shows, as soon as we adopt a systemic approach, it becomes harder to determine whether the overall impact is negative or positive, which instead appears to be mixed. Therefore, it would require more arbitrary decisions to define the final impact of a policy on a whole system as all the policies contain objectives that balance each other and are neither fully negative nor fully positive. Thus, using this method allowed us to link the impacts on ecosystem services with land management aspirations and to identify the kind of objectives likely to affect positively or negatively the provision of ecosystem services. One of the main drawbacks of this approach is that it is time-consuming.

Some of the policies, such as the "Marine (Scotland) Act 2010" or "The Water Environment and Water Services (Scotland) Act 2003" do not represent the right level to conduct an ecosystem services assessment as they are too strategic and do not have a direct impact on ecosystem services. Indeed, this analysis might be biased, as the real impact of these policies on ecosystem services will only be seen through the application of more operational policies which represent the actual translation of their aim to a local scale. To go further, we should identify the operational plans and programmes that are likely to influence the management of rural areas and analyse their impacts on ecosystem services.

For the study, we chose to use the typology of the UK-NEA (2011) to classify ecosystem services. However, during the course of the work it became clear that this classification may not be the most appropriate in this context. Indeed, there are some services that are missing, such as the natural flows of energy, solar, wind or tide, or other materials such as rocks or gravels. This abiotic dimension is not included in the UK-NEA typology and represents an important drawback because the flows of energy will become increasingly important as climate change becomes a central element in policies. The classification of De Groot (2002) used by Jose Muñoz-Rojas is very interesting, particularly with regards to the "Carrier functions", which includes all human activities. This typology includes a strong human dimension particularly relevant in the context of an Ecosystem Approach. In addition, it might be interesting to use this typology because land managers will be able to clearly see the trade-offs between different land-based activities.

Finally, the matrix of policies-ecosystem services contains two columns that have not been used for the study and that we could have either deleted or used more wisely. The first column is the scale of action of the policy, which is mostly national. This scale should be shifted to a more local level. The second column contains the sources and additional comments. This one has almost not been used because of a lack of time. If we had had more time, each cell would have contained sources of external studies or reports to back up the decisions made to define the impacts of policies on ecosystem services. This is one of the main flaws of the analysis, because all the decisions are based on our expert opinion, which may not be the most accurate source. It is still possible now to look for studies to support our decisions and add them in the columns.

2. Stakeholders analysis

This analysis is purely theoretical and based on literature and information gathered on organizations websites about their goals, aims and projects. It does not consider specific stakeholders' actions and impacts as these ones have been brought together into categories. In addition, the analysis does not take into account unpredictable forces that can drive stakeholders' behaviour such as market and economic forces, technical evolution or stakeholders' preferences. It offers a framework for thought about the relationship stakeholders have with ecosystem services but needs to be ground-truthed and submitted to stakeholders to discuss as interest and influence can be tricky to define and appreciate.

a. Stakeholders-ecosystem services matrix

This matrix allows us to see the links between the ecosystem services and the stakeholders and help us build the interest-influence grids of ecosystem services (see Interest-influence grids of the ecosystem services. Due to their reliance on ecosystem services, these stakeholders should be highly involved and taken into consideration into decisions regarding to land use and opportunities to empower them have to be encouraged. To minimise their negative impacts on the delivery of ecosystem services, it will be necessary to educate them and raise their awareness about environmental and energy issues.

Depending on their sector, the stakeholders do not have the same relationship with ecosystem services. Indeed, the public sector tends to affect more the delivery of ecosystem services than it is affected by it (Figure 12). Indeed, most of these stakeholders aim to protect and enhance the environment. They are directly controlled by the Scottish Government and are thus committed to contribute to deliver the Land Use Strategy. Their role will be crucial to ensure that ecosystem services are taken into account into decisions and policies.

Type	Stakeholders	Sector	Supporting Services				Provisioning services				Cultural services		Regulating services					
			Primary production	Water cycling	Soil formation	Nutrient cycling	Crops, livestock, fish	Trees, standing vegetation, peat	Water supply	Wild species diversity	Wildlife species diversity	Environmental settings	Climate regulation	Pollination	Detoxification and purification in soils, air and water	Hazard regulation	Noise regulation	Disease and pest regulation
Public sector	Aberdeenshire Council	Spatial planning and Land Use																
	Forestry Commission Scotland	Forestry																
	Historic Scotland	Built Environment																
	Scottish Water	Water																
	Scottish Environment Protection Agency	Water, Biodiversity																
	Scottish National Heritage	Biodiversity																
	Transport Scotland	Transport																
	Scottish Enterprise	Business																
	Marine Scotland	Marine																
	Visit Scotland	Business																
	Ministry of Defence (Army)																	
	Organisations committed to high quality food delivery	Business																

Figure 12: Stakeholders-ecosystem services matrix - Public sector

There are three stakeholders from the public sector that differ from the others. The first one is the Scottish Water which depends on the supporting and provisioning services linked to water quantity and quality as well as on the regulating service that will contribute to improve water quality for its economic activity. However, its large scale abstractions may be able to affect the water cycle and thus the water supply. Visit Scotland relies on the delivery of cultural services as they represent the "raw material" of its activity. They can indirectly affect their delivery by influencing people's behaviour, but this has not been taken into account in this analysis as stakeholders related to awareness-raising have been excluded. Organisations committed to high quality food delivery rely on the ability of the natural environment to regulate pests and disease and to provide a high genetic diversity to improve breeds and species.

Conversely, the private sector influences the delivery of ecosystem services as much as they rely on it (Figure 13). Indeed, many of the stakeholders of this ecosystem have land-based activities, such as land owners and land managers or forestry industries and act directly on the components of the natural environment.

Type	Stakeholders	Sector	Supporting Services				Provisioning services				Cultural services		Regulating services					
			Primary production	Water cycling	Soil formation	Nutrient cycling	Crops, livestock, fish	Trees, standing vegetation, peat	Water supply	Wild species diversity	Wildlife species diversity	Environmental settings	Climate regulation	Pollination	Detoxification and purification in soils, air and water	Hazard regulation	Noise regulation	Disease and pest regulation
Private sector	Forestry industries	Forestry																
	Tourism-based businesses	Business																
	Renewable energy companies	Energy																
	Land owners and land managers & their representative organisation	Spatial planning and Land Use, Agriculture, Forestry, Business																
	Oil and gas industries	Energy																
	Food processing industries	Business																
	Developers and building companies	Built environment																
	Transport related businesses	Transport																
	Fishery-based businesses (Marine and Freshwater)	Business, Marine																

Figure 13: Stakeholders-ecosystem services matrix - Private sector

For instance, land owners and managers include multiple activities (cropping, forestry, game species, livestock, etc.). Their role is quite ambiguous and they can be either affected by the delivery of ecosystem services or affect it depending on their drivers and which incentives they respond to. If they are part of an agri-environment scheme, or follow the cross-compliance guide, they are likely to contribute to meeting national economic, social or/and environmental targets and thus to protecting and delivering ES.

The private sector is indirectly controlled by the Scottish Government as it is regulated by organisations belonging to the public sector. The goal of the latter will be to influence the former to take the LUS into

account to ensure that the negative impacts on the delivery of ecosystem services will be minimised. In the workshop held in Banchory on June 28th, participants have shared the need to create a more flexible incentives scheme, which must be adapted to the local context and favour collaboration across landscapes, in particular between land owners and stakeholders.

Type	Stakeholders	Sector	Supporting Services				Provisioning services				Cultural services		Regulating services					
			Primary production	Water cycling	Soil formation	Nutrient cycling	Crops, livestock, fish	Trees, standing vegetation, peat	Water supply	Wild species diversity	Wildlife species diversity	Environmental settings	Climate regulation	Pollination	Detoxification and purification in soils, air and water	Hazard regulation	Noise regulation	Disease and pest regulation
Third sector	Organisations/groups committed to carbon reduction and energy savings	Energy											▓					
	Game management organisations	Spatial planning and Land Use					▓			▓	▓							
	Recreational Organisations	Spatial planning and land use									▓	▓						
	Conservation Bodies	Spatial planning and Land Use, Biodiversity		▓	▓	▓	▓	▓			▓	▓	▓	▓	▓	▓	▓	▓
	Community empowerment oriented groups	Spatial planning and land use						▓				▓						

Figure 14: Stakeholders-ecosystem services - Third sector

The third sector mostly affects the delivery of ecosystem services and mainly in a positive way (Figure 14). These organisations can have an important role in the delivery of the LUS and of ecosystem services due to their actions and also to their relationship with local communities and other various stakeholders. In addition, some of them act at a large scale. For instance, National Trust for Scotland is Scotland's largest membership organisation with 312,000 people across the world and looks after, amongst other things, 130 properties of significant historic and architectural value, including castles, palaces, cottages, mills and great houses, and 200,000 acres of countryside. This organisation has the potential to influence a large amount of people and indirectly to contribute to the delivery of ecosystem services and of the RLUP. However, this aspect is not taken into consideration for this analysis.

Type	Stakeholders	Sector	Supporting Services				Provisioning services				Cultural services		Regulating services					
			Primary production	Water cycling	Soil formation	Nutrient cycling	Crops, livestock, fish	Trees, standing vegetation, peat	Water supply	Wild species diversity	Wildlife species diversity	Environmental settings	Climate regulation	Pollination	Detoxification and purification in soils, air and water	Hazard regulation	Noise regulation	Disease and pest regulation
	Local communities						pink	pink	pink	olive	olive	olive	pink	olive	olive	olive	olive	olive
	Visitors/Tourists						pink		pink	olive	olive	olive	blue	olive	olive	blue		

Figure 15: Stakeholders-ecosystem services matrix - Local communities and visitors/tourists

Local communities depend on the multiple benefits provided by nature, especially on regulating services that ensure a high quality environment, as well as on provisioning services that contribute to deliver essential goods such as food and water. Finally, cultural services have a strong role to play in communities' well-being and health. However, local communities can also affect the delivery of ecosystem services by using land to build their house; emitting GHG; producing solid waste and waste water (Figure 15).

Visitors and tourist depend almost on the same ecosystem services, except that they do not rely as much as local communities on regulating services as they visit areas for a short amount of time. Water quality is very important, especially for aquatic activities. In addition, visitors/tourists can cause erosion by stamping in highly frequented areas (Figure 15).

Due to their reliance on ecosystem services, these stakeholders should be highly involved and taken into consideration into decisions regarding to land use and opportunities to empower them have to be encouraged. To minimise their negative impacts on the delivery of ecosystem services, it will be necessary to educate them and raise their awareness about environmental and energy issues.

b. *Interest-influence grids of the ecosystem services*

Supporting services

Supporting services have been grouped because they indirectly affect most of the stakeholders and are affected indirectly as well. Basically, all stakeholders rely more or less indirectly on the delivery of supporting services are they are, as their name indicates, the support of all life. They represent the functions that underpin all services on which we all depend. The graph below (Figure 16) illustrates perfectly the fact that most of the stakeholders, owing to their indirect relation with supporting services, are part of the crowd.
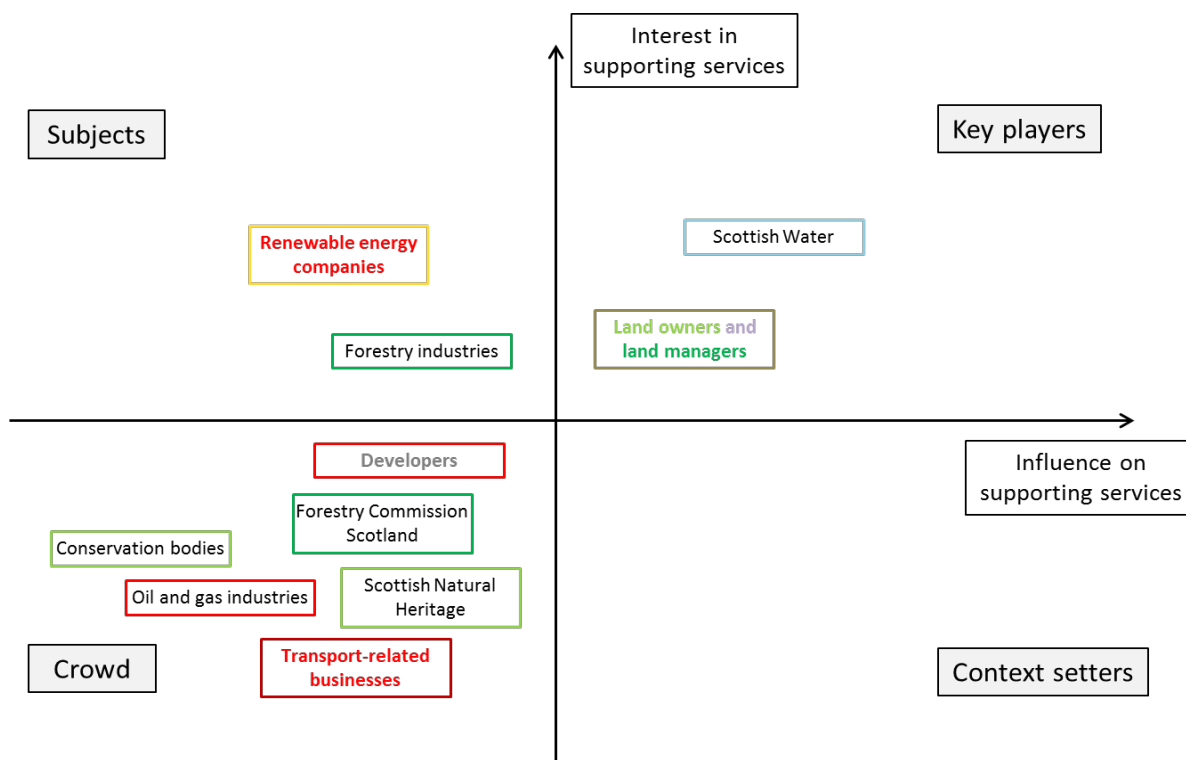
Figure 16: Interest-influence matrix of supporting services

The key players are represented by the land owners and managers and Scottish Water. Indeed, Scottish Water has a high interest in the water cycle as its economic activity relies on the good functioning of this ecosystem service. However, as Scottish Water represents the main water provider in Scotland, and more specifically in Aberdeenshire, it is likely that it will have a high influence on the delivery of ecosystem services because abstractions are one significant driver of the amount of water available (UK National Ecosystem Assessment, 2011). Many activities of land owners and land managers rely directly upon supporting services as they are closely related to plant production, thus their interest in supporting services is high. They have a lot of influence through their activities and their ownership and are considered as major drivers in the delivery of supporting services (UK National Ecosystem Assessment, 2011).

Conservation bodies, including public agencies, act influence indirectly the delivery of supporting service through conservation or restoration projects that aim at restoring or maintaining natural functions. The business sector is mostly involved in the delivery of supporting services because of its significant water abstractions and soil sealing impacts.

Crops, livestock, fish

Key players of this provisioning service are the fishery-based businesses as well as the land managers and owners due to their direct relationship with the natural resources (Figure 17). Their economic activities are strongly related to the delivery of this provisioning service; this contributes also to their influence over the resource, whether the fish stock, the livestock, the games species or the crops. Farmers have responded to financial and social drivers that have encouraged them to increase the production and thus production from managed resources has significantly increased. They still

contribute to this by improving the livestock or the crops or adding fertilizers to increase plant growth. The land can also be managed for shooting purposes, as the muirburn practice shows for instance, and thus land managers can have a high influence on the delivery of this ecosystem service.

Fishermen rely on fish stocks for their economic activity, but the overexploitation of the resource can reduce it significantly and thus affect the delivery of this ecosystem service. Game management organisations have a strong interest in game species and may have a strong influence on them by managing the populations and acting on people's behaviour.
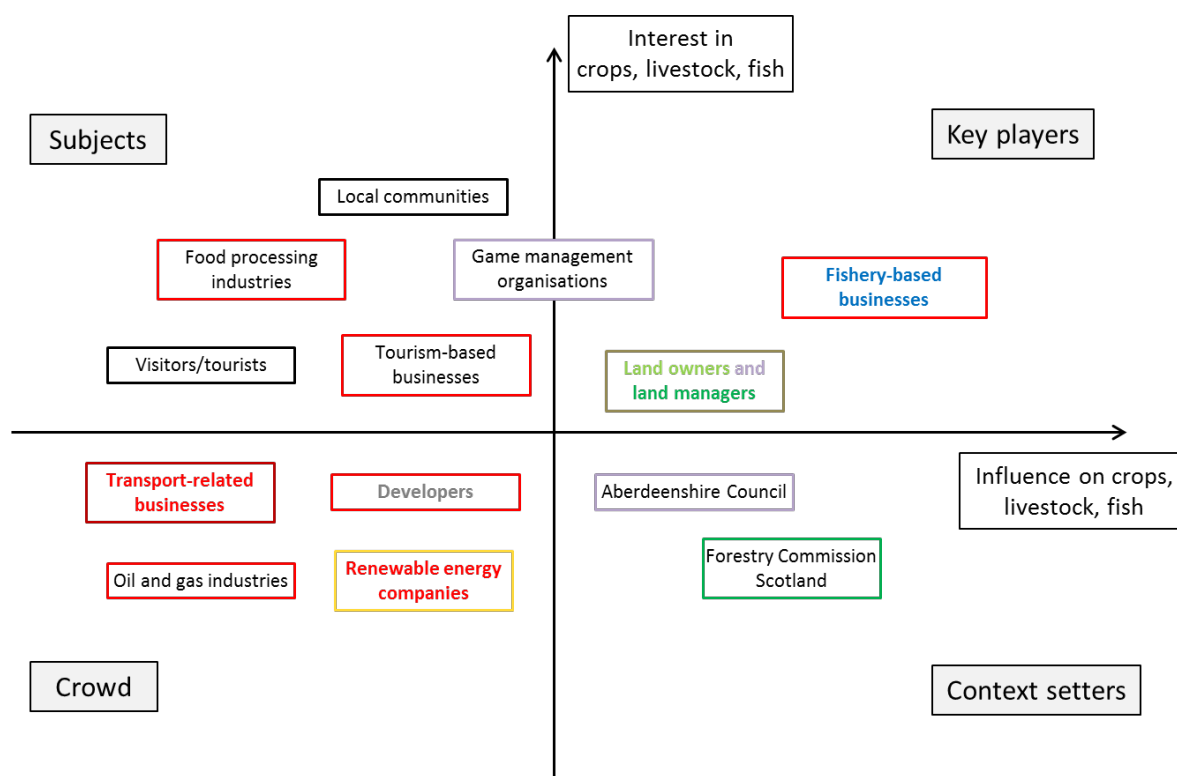

Figure 17: Interest-influence matrix of crops, livestock and fish

The business sector does not generally have a lot of influence upon this ecosystem service whereas food-related businesses are strongly dependent on its delivery. The activities of other businesses can eventually compete with the provision of this ecosystem service. For instance, oil and gas industries have a potential unintended impact on the fish resource as their activities are at the root of many disturbances and pollutions. Other businesses indirectly compete with the provision of this provisioning service as their activity may occupy lands or areas which could be designated for production or fishing purposes.

Trees, standing vegetation, peat

The forestry sector represents the key sector for this ecosystem service as its activity is highly related to trees and vegetation (Figure 18). In particular, the Forestry Commission Scotland has laid out many strategies aiming at increasing the woodland cover for multiple purposes including supporting the forestry industry. It also has an agency called Forestry Enterprise Scotland that manages government's

forests and which is dedicated to an economic activity and lease land to landholders and farmers for forestry activities. Land owners and managers can orient their activities towards forestry or choose to respond to government's incentives and woodland cover increase targets and thus have a high interest in this resource. Their ownership and thus legitimacy over the forest resource confer them a high influence on this ecosystem service.

Scottish Environment Protection Agency and the Scottish Natural Heritage have a lot of influence on this ecosystem service through their conservation and restoration projects; however, they do not have much interest in provisioning services. Renewable energy companies, developers and transport-related businesses rely on the provision of raw material, whether for energy production or for construction materials.

Local communities have little influence and interest on the provisioning services, except to meet some specific and one-time needs, such as furniture, ornamental plants or peat for the garden.
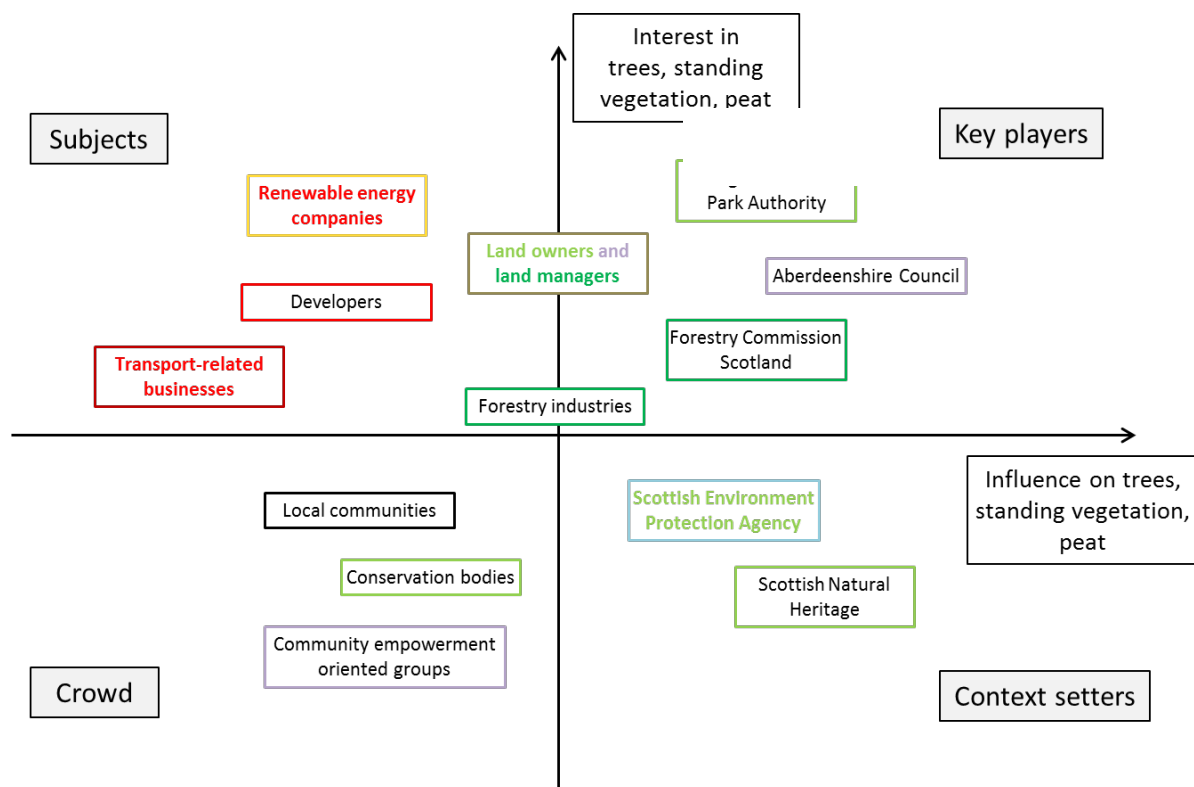
Figure 18: interest-influence grid of trees, standing vegetation and peat

Water supply

Water supply supports a lot of human activities and thus is of high interest for many industries, such as oil and gas industries, building industries or food processing industries, which consume large amounts of water (Figure 19). Large scale abstractions can considerably affect water supply. However, their influence can be variable depending on many factors, such as the size of the company or the extent of their projects for instance. It is likely that the new political context set in the Water Resources (Scotland)

Act 2013, which aims at controlling the water abstractions in Scotland, has an impact on their influence on this ecosystem service. Land owners and land managers whose activities are oriented towards food production consume important quantities of water, for irrigation for instance, and their economic activity is strongly dependent on the provision of this ecosystem service.

The economic activity and the duty of Scottish Water is to provide water, thus it strongly relies on the delivery of this ecosystem services but it also has an important influence on it owing to its scale of action. SEPA is one of the key players in the delivery of this ecosystem service owing to its statutory power that gives it a high interest and a strong influence on water supply. It is in charge of ensuring good water quality through regulations, monitoring, protection and restoration of the natural environment and the natural functions.

Clean water for drinking or bathing purposes is necessary to ensure local communities' health, supports the tourism industry; in particular hotels, restaurants or businesses linked to water recreation such as kayaking, and attract visitors. Hence these stakeholders have been classified as subjects as they are dependent on water supply, but with little formal influence on it. The key players circled potentially act more like subjects as they rarely are involved in water management decision making.
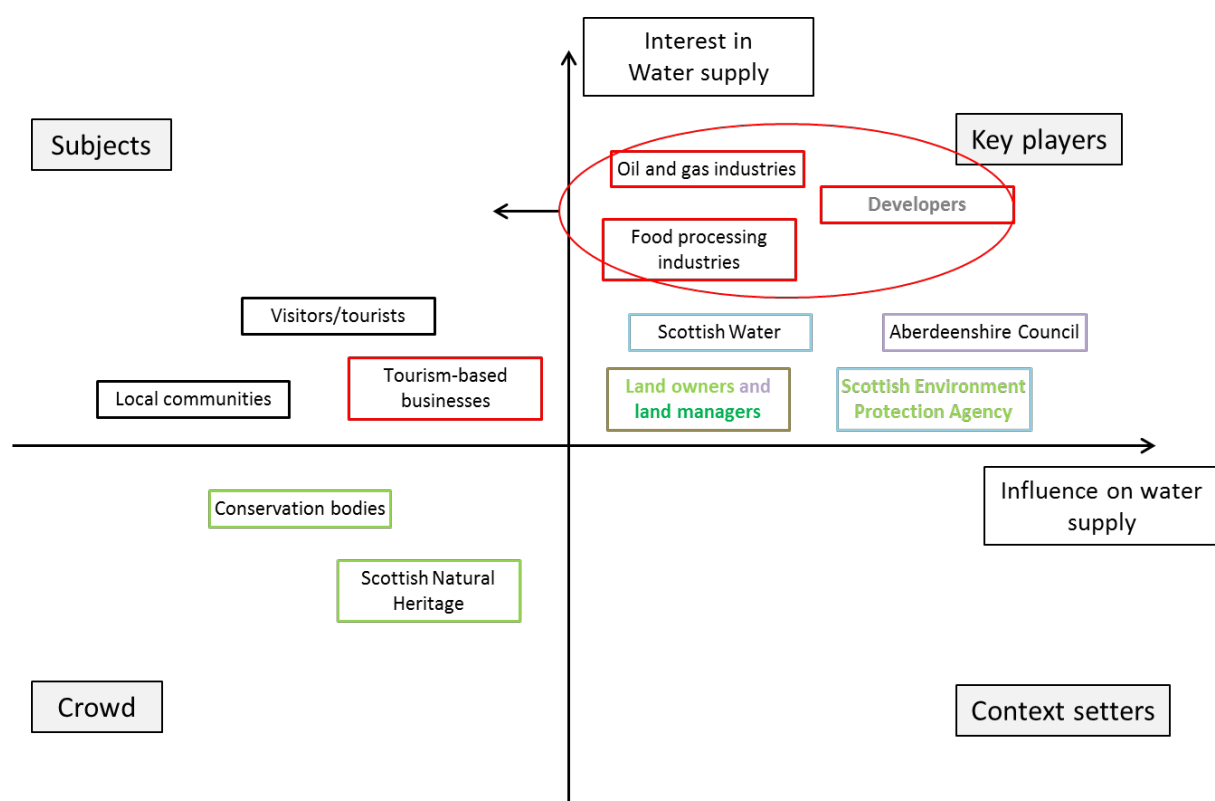

Figure 19: Interest-influence matrix of water supply

Wildlife species diversity

The provision service as well as the cultural service of wildlife species diversity have been merged as there were not many differences between them in the matrix of the ecosystem services and the stakeholders.

As expected for this ecosystem service, the key sector is represented by the biodiversity sector, whose mission is to protect, enhance and restore the natural heritage for the benefit and the enjoyment of all (Figure 20). The biodiversity sector is composed of government agencies, of partnerships such as JNCC and by conservation trusts, included in the land owners. Whether through their remits, their statutory power, their legitimacy, their missions or their rights to the land, they share a common interest in the provision of this ecosystem services and highly contribute to their delivery through their actions. Marine Scotland has a great role to play in the marine environment and in charge of ensuring that it is healthy and sustainable. Aberdeenshire Council is committed to protect the natural heritage and is involved in several partnerships, the North East Scotland Local Biodiversity Action Plan, the Dee Catchment Partnership and has thus a strong role to play in the delivery of this ecosystem service.
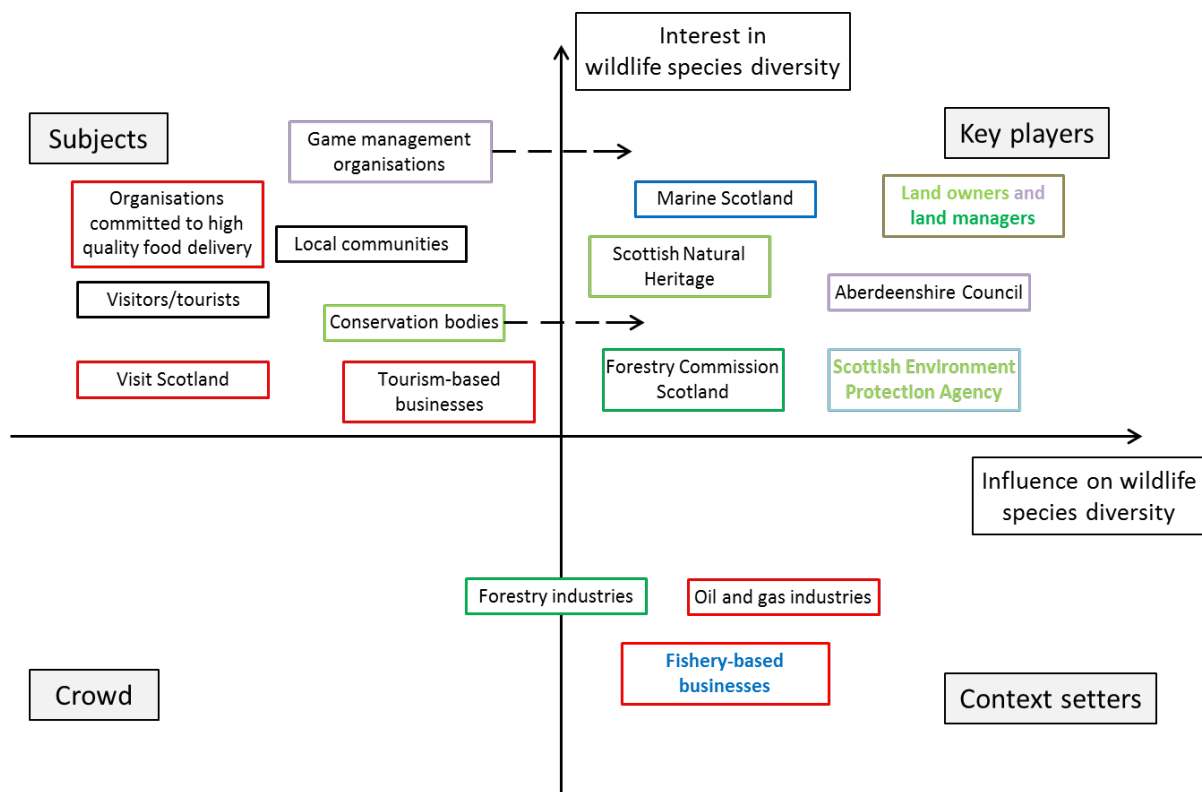
Figure 20: Interest-influence grid of the wildlife species diversity

Land managers include farmers, crofters, foresters and gamekeepers. An inappropriate management and harmful practices can have adverse impacts on the biodiversity. Unsustainable agriculture represents one of the greatest threats to biodiversity, through land conversion and habitat loss; pollution; erosion and degradation of soil or through genetic erosion. However, the agricultural context has been strongly shaped by the CAP and Scottish policies aiming at applying at a national scale the

principles of the CAP and at protecting the environment. As a consequence, practices have evolved and targets have changed and are more numerous than before. Although farmers are strongly regulated and must comply with many different measures aiming at mitigating their impacts on the environment, their influence over biodiversity remains significant. Political, demographic and social drivers are likely to affect farmers' behaviour but it is almost impossible to predict how and which will be the consequences on the delivery of this ecosystem service. It depends for instance on questions such as "what are the implications of the CAP reform?"; "how will the next SRDP look like?"; "which incentives will be implemented?"; "how much will it be necessary to produce and thus is there a need to convert more land?"; etc.

The context setters are mostly represented by the business sector whose activities are likely to have a strong influence on the delivery of this ecosystem service, in particular due to the extent of their activities. Exploration and production can affect wildlife species, especially the fish stock by disturbing them, killing eggs, or killing fish due to water contamination (oil spill for instance). Interference with behavioural activities and habitat fragmentation, modification or reduction can also affect significantly wildlife species diversity. Some fishing techniques can significantly damage habitats such as trawling and lead to a loss of wildlife species diversity. This can also be caused by selected fishing, alteration of populations' structure and trophic network. More specifically, capture fisheries impact target resources. They have the potential to reduce their abundance, spawning potential and, possibly, population parameters (growth, maturation, etc.) and to modify age and size structure, sex ratio, genetics and species composition of the target resources, as well as of their associated and dependent species.

The subjects include the tourism sector which benefits economically from wildlife species diversity, which appeals tourists and visitors who have a strong interest in environment. Indeed, populations of puffins, deer or seals represent a major attraction for tourists and visitors. Game management organisations and conservation bodies are highly interested in this ecosystem service and have here been included as subjects. However, they can contribute to the delivery through training, advice, guidance and management. For instance, the Association of Deer Management Group is committed to the welfare of deer and their habitat through sustainable management practices.

Environmental settings

The environmental settings can be defined as places where people interact with nature and thus overlap with many ecosystems and habitats and combine with built environment and human activities (UK NEA, 2011). Consequently, the delivery of this ecosystem service affects and is affected by multiple stakeholders form various sectors (Figure 21).

The key players are represented by the biodiversity and the built environment sector, as well as by Aberdeenshire Council and Marine Scotland whose remits encompass these two sectors. Indeed, through its activities, and through the application of the National Marine Plan, Marine Scotland is committed to enhance the environmental settings, while Aberdeenshire Council is committed to safeguard and enhance the natural, cultural and the built environment as irreplaceable heritage. It also works with Forestry Commission Scotland (FCS) to implement the strategy "Woods In and Around Towns" and has the duty to look after recreational and leisure's services including parks. Forestry Commission Scotland's missions and actions, in particular through its strategy and plans, contribute to

the delivery of this ecosystem service. It specifically aims at expanding the woodland cover to deliver multiple benefits. The built environment's dimension is taken into consideration through the work of Historic Scotland and some developers specialized in monuments restoration.
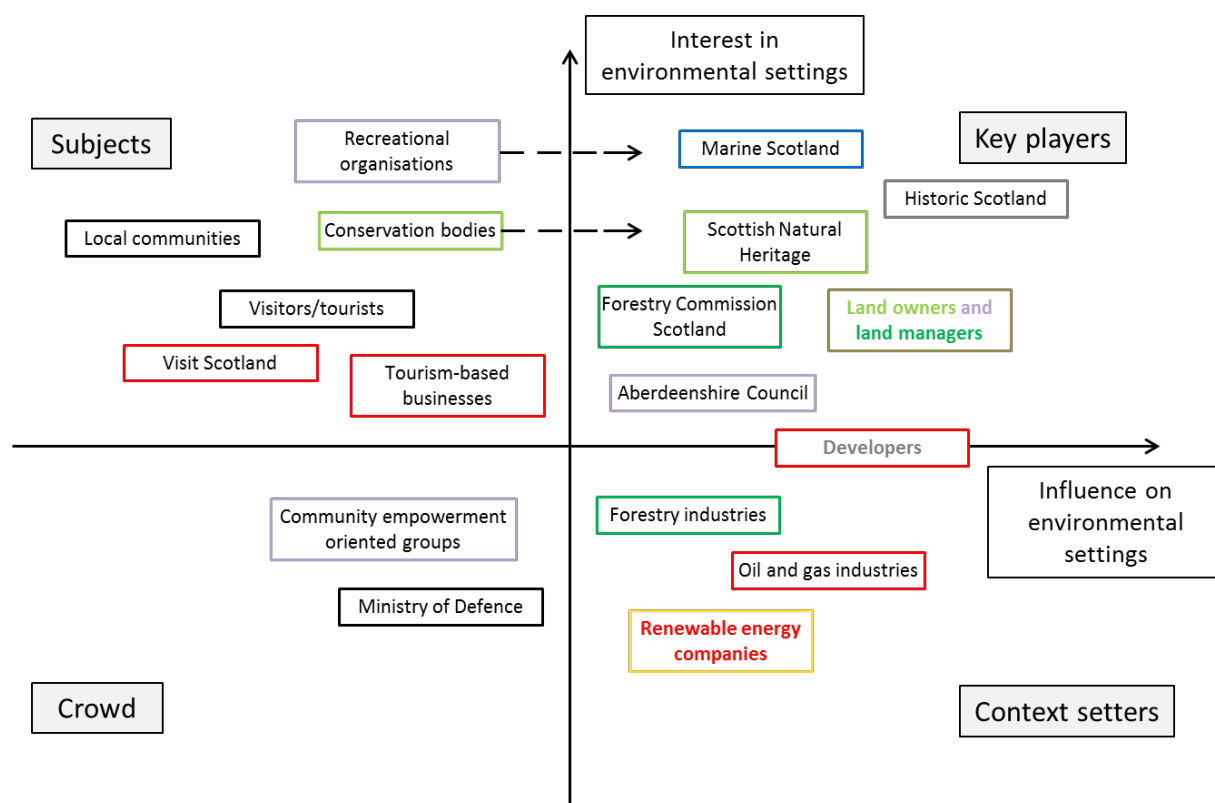

Figure 21: Interest-influence grid of environmental settings

The business sector is the main context setter for the delivery of this ecosystem services due to the visual impact and the extent of its activities. Wind farms represent for instance a contentious point because they have the potential to alter the landscape quality.

The tourism sector is again found amongst the subjects in relation to cultural services. Environmental settings underpin the economic activity of tourism-based businesses and represent an attraction factor for tourists and visitors. They are also very important for local communities as they give rise to the cultural goods and benefits that people obtain from nature (UK NEA, 2011), whether national parks; gardens; ponds; green spaces or cultural monuments. Recreational organisations and conservation bodies can also be regarded as subjects as they have an interest in environmental settings but are mostly without much official influence. However, through their activities, which consist in safeguarding the access to the land for people, recreational organisations help increase interactions with the environmental settings, which can in turn influence the environmental setting. Conservation bodies may likewise influence people's behaviour in relation to environmental settings. Hence recreational organisations and conservation bodies could also be regarded as key players.

The activities of the army can potentially affect the delivery of this ecosystem service, in particular the environmental settings by occupying vast extents of land, building infrastructure and preventing people

to access some areas. However, in Aberdeenshire there is no big military base and trials and thus their activities do not have a great impact on the provision of this ecosystem service.

Climate regulation

Drivers of climate regulation services associated to land use and thus to human activities are the most direct and immediately important (UK NEA, 2011). Consequently, the delivery of this ecosystem service involves multiple stakeholders from all the 10 relevant sectors selected for this analysis (Figure 22). Most of the stakeholders, who act in favour of the delivery of this ecosystem service, tend to focus on carbon emissions reduction or renewable energy development. Few of them contribute to the provision of this service in an indirect way by protecting or restoring habitats that will sequester carbon. The stakeholders whose actions affect the delivery of this ecosystem service usually are greenhouse gas emitters, such as industries.

The key sectors are business; transport; marine; spatial planning and land use and forestry. The stakeholders representing these sectors are government agencies, such as Marine Scotland; devolved and regional administrations such as Aberdeenshire Council or, as Scottish Enterprise, strong partners of the Scottish Government. Consequently, they support the implementation of Scottish Government's strategies and are committed to meet the carbon reduction targets. Due to their remits, their statutory or regulatory powers or their influence on planning, they are likely to have a strong influence on climate regulation services. Marine Scotland, for instance, supports the development of renewable energy, in particular offshore wind farms or tidal energy, through the "National Marine Plan". Transport Scotland encourages a shift towards low carbon technologies which should help reduce carbon emissions.

Scottish Enterprise is likely to have a strong impact through its influence on many other stakeholders. It is devoted to reduce carbon emissions and to encourage companies to shift towards low carbon technologies, products and processes and can therefore affect the delivery of this ecosystem service.
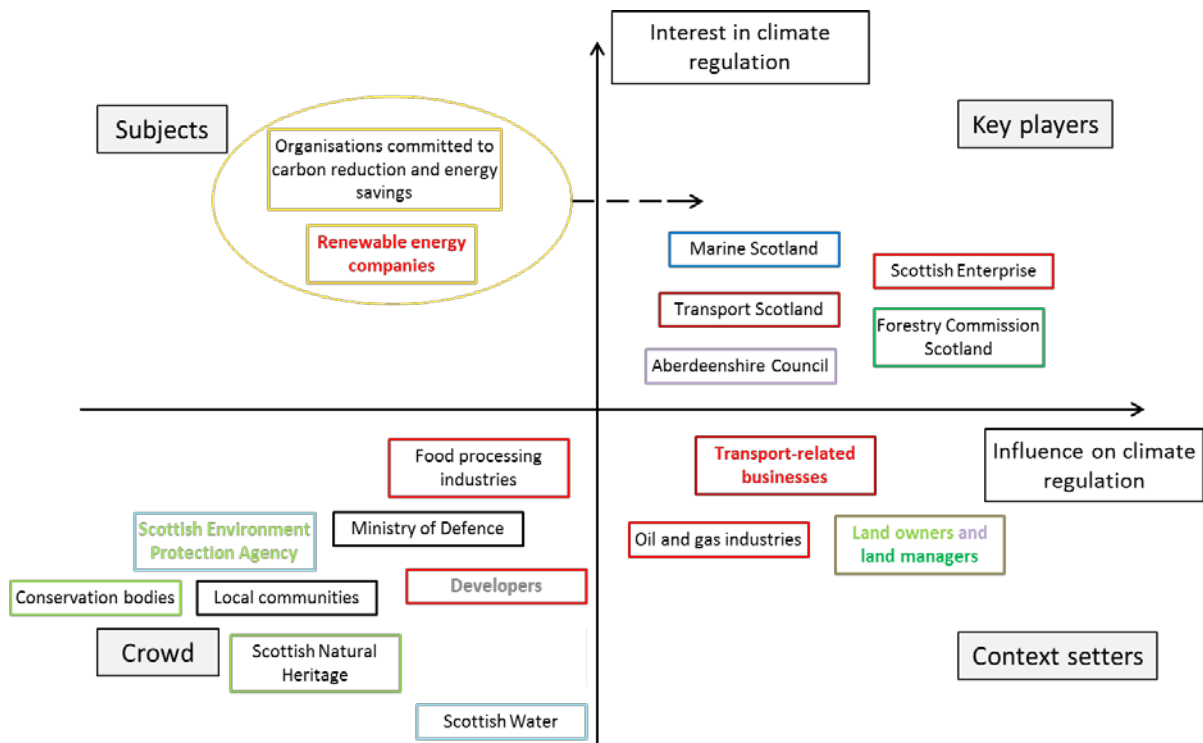
Figure 22: Interest-influence grid in climate regulation

The business sector mainly affects climate regulation services through their CO2 and non-CO2 greenhouse gas emissions. Their relative influence depends on the extent of their activity. Indeed, transport and oil and gas industries are known as ones the biggest carbon emitters.

The energy sector represents either a subject or a key player depending on the extent of their activity; their influence can be very variable depending on the size of the organisation, on the number of clients or of people trained and advised or on the size of their projects for instance. The organisations or industries of this sector work to achieve a common goal of carbon reduction and of renewable energy development which should contribute to the delivery of climate regulation services.

The biodiversity sector affects indirectly the delivery of this ecosystem service through its conservation and restoration projects and by supporting the Scottish Forestry Strategy and the woodland expansion targets. The vegetation and habitats protected or restored will contribute to sequestering carbon and thus to climate regulation.

Pollination

The key players for the delivery of this ecosystem service are mainly represented by the biodiversity sector (Figure 23). All the key players are committed to protect and enhance the natural heritage and work in partnership to deliver the Scottish Government's strategies, such as the Scottish Forestry Strategy, that should help enhance the habitat connectivity and consequently favour pollination.

Land owners and land managers are strongly related to the delivery of this ecosystem service. Indeed, farmers' activities depend on pollination services and some land owners may also have honey production activities. However, agriculture can have adverse effects on this service through land conversion and pesticides application.

Other stakeholders related to pollination are the tourism-based businesses, such as hotels, restaurants or souvenirs shops that may sell honey products to visitors or tourists. The business, the built environment and the transport sectors are the most likely to affect negatively the delivery of this ecosystem services by contributing to land conversion for urban development and to habitat land, degradation and fragmentation, which in turn can indirectly affect the delivery of this ecosystem service.
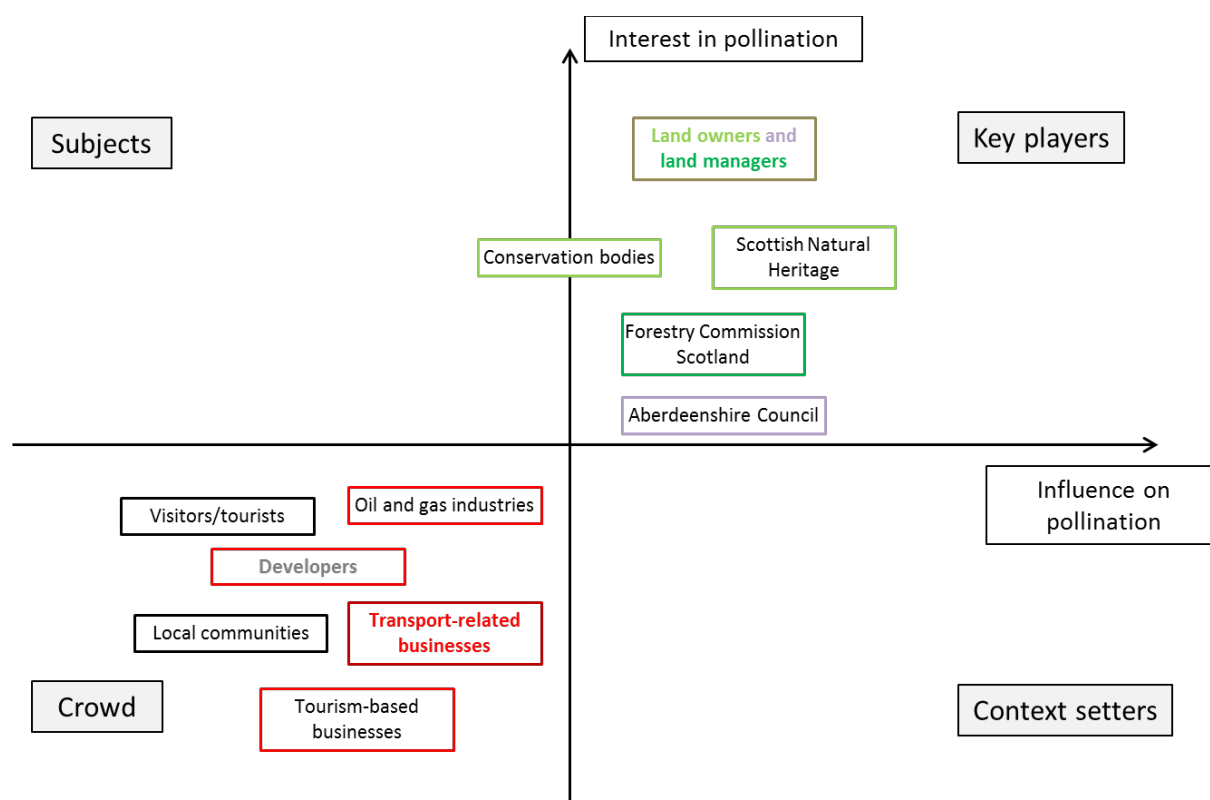
Figure 23: Interest-influence grid of pollination

Detoxification and purification in air, soil and water

The main sectors related to the delivery of this ecosystem service are sectors linked to water, forestry and biodiversity (Figure 24). Indeed, the stakeholders who appear on this grid share the same objectives and work in partnership to protect and enhance the natural heritage resources. All of them support the Scottish Forestry Strategy, which intends to increase the woodland cover and at delivering multiple benefits. Trees provide services such as detoxification and purification in soil, air and water and implementing them in an urban context, by applying the strategy "Woods In and Around Towns" can contribute to improving air quality.

Land owners and land managers' activities have a most ambiguous role in the delivery of this ecosystem service as they do not all share the same objectives. Hence, they can either disrupt natural processes or encourage them depending on their goals and on their practices. In addition, farmers depend on healthy soil for their production and have thus a high interest in this ecosystem service.

Scottish Natural Heritage contributes indirectly to the delivery of this ecosystem service, through its conservation and restoration projects that aim at restoring natural functions.

Scottish Water and local communities both rely indirectly on the natural functions of the environment to purify water, one for an economic purpose and the second for health reasons.
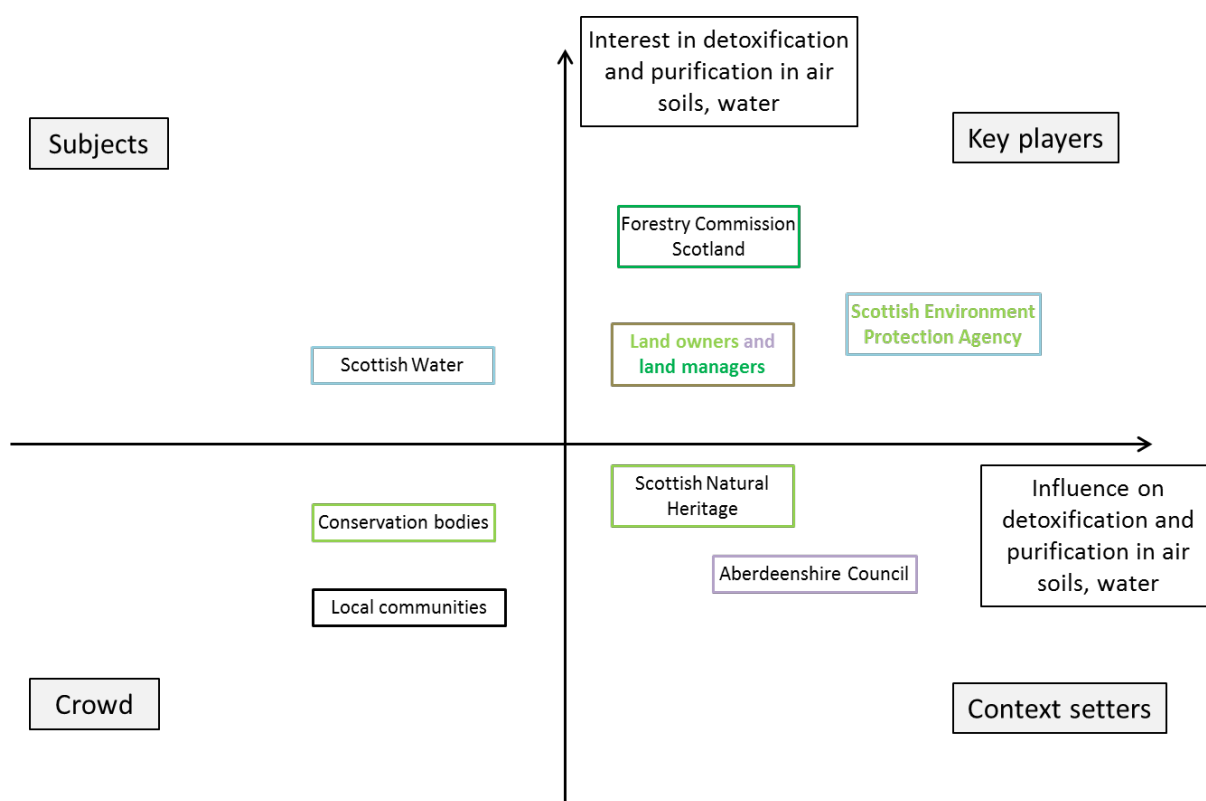
Figure 24: Interest-influence grid of detoxification and purification in air, soil and water

Hazard regulation

Land owners and land managers represent a very important stakeholder for the delivery of this ecosystem service (Figure 25). Indeed, they could be one of the keystones for the success of the Scottish Forestry Strategy and other forestry-related strategies such as the rationale for woodland expansion, which aim at delivering multiple benefits, including sustainable flood management. Private landowners are encouraged to plant trees on floodplains to combine economic benefits with natural flood management. This strategy is also supported by SEPA and SNH, through advice; consultation; management, conservation and restoration projects of floodplains and wetlands and woodland creation. Indeed, planting trees help reduce erosion, favour drainage and maintain river banks.

However, land owners and land managers can also have adverse effects on this ecosystem service by contributing to erosion or to the creation of a hardpan that can hinder the drainage and lead to runoffs and to erosion. Developers and oil and gas industries can have similar effects by sealing the soil and removing vegetation and topsoil.

Local communities, visitors and tourists benefit from the delivery of this ecosystem services as it ensures their safety, and are hence in the subjects group. Restoration projects conducted by SEPA and SNH guarantee the security of local inhabitants and of their commodities against flooding for instance. Visitors and tourists can be safer on tracks if there is no risk of landslides. However, in highly frequented areas, they can also contribute to erosion of the tracks or of the areas around tracks by removing the topsoil vegetation.
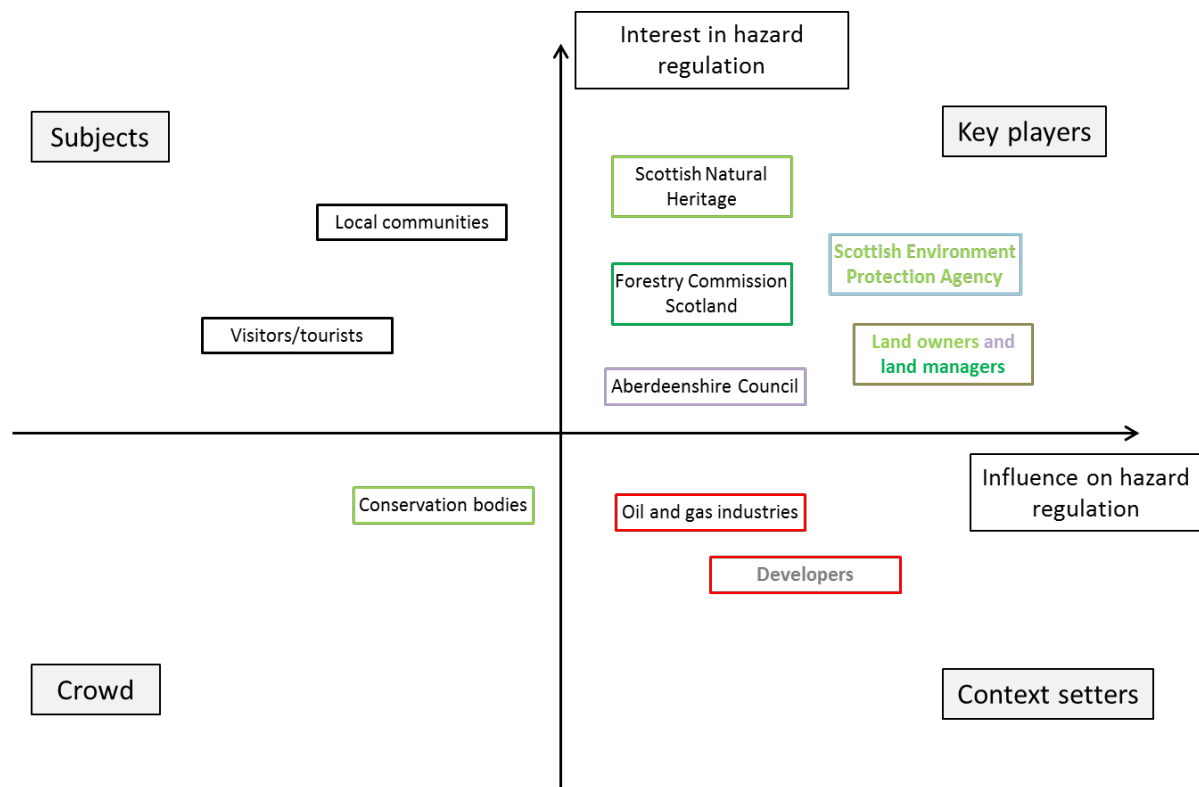
Figure 25: Interest-influence grid of hazard regulation

Noise regulation

All the stakeholders involved in the delivery of this ecosystem service act indirectly on it, however, some of them still have more influence than others and thus have been put in key players even though their action is indirect (Figure 26). For instance, Aberdeenshire Council contributes indirectly to the delivery of this ecosystem service by safeguarding the environment and supporting "Woods In and Around Towns" (WIAT), which aim at protecting "good noise". SNH is committed to protect the natural heritage, which provides habitats for a range of wildlife species that in turn produce good noise for the benefit of local communities. Noise regulation represents a quite important ecosystem services for local communities, especially in cities, as road traffic is considered as the main source of noise in UK (Grimwood, 2002) and that according to the National Noise Attitude Survey, 18% of the people interviewed listed noise as one of the top five environmental problems that affect them (Grimwood, 2005).

Transport-related businesses are thus considered as having a high influence on the delivery of this ecosystem service as they are responsible for the production of "bad" or "disturbing" noise. To tackle these problems, the Forestry Commission Scotland has laid out the "WIAT" strategy which should enhance the quality of life in an urban context and abate noise disturbances. Through its actions and the delivery of its strategies, Forestry Commission Scotland is likely to have a high influence on the delivery of this ecosystem service.
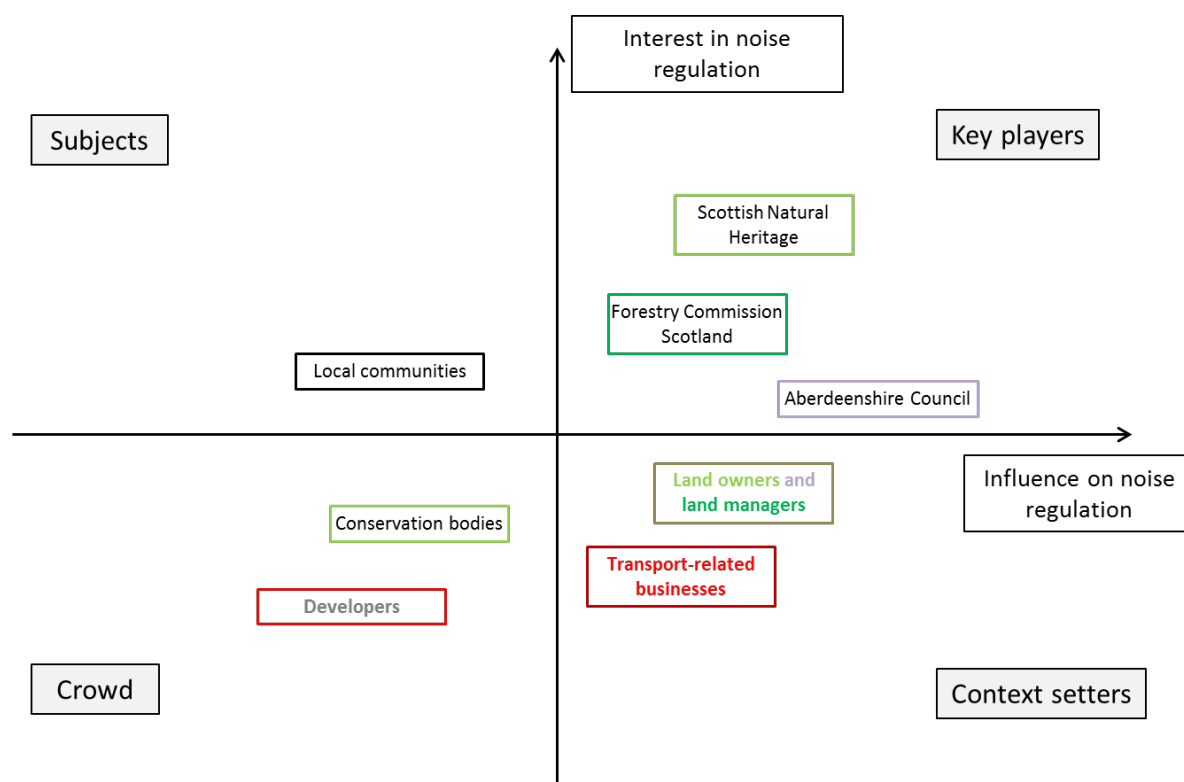
Figure 26: Interest-influence grid of noise regulation

Disease and pest regulation

Both forestry industries and land owners and land managers rely on the ability of nature to regulate pest and disease, to avoid disease or pest outbreaks that could cause significant damages to their activity and their economic situation. However, by favouring monoculture and fragmenting or reducing habitats, they can contribute to disrupting natural processes of pest and disease regulation. Hence, they are amongst the key players with regard to this ecosystem service (Figure 27).

Scottish Natural Heritage and Forestry Commission Scotland are committed to safeguard the natural heritage, re-establish connectivity and protect wildlife species diversity. These actions contribute to maintaining or restoring natural disease and pest regulation functions and increase ecosystems resilience, for the benefit of farmers, gamekeepers or forestry industries as well as local communities. Indeed, these ones depend on this function to limit the propagation of diseases and ensure their good health.
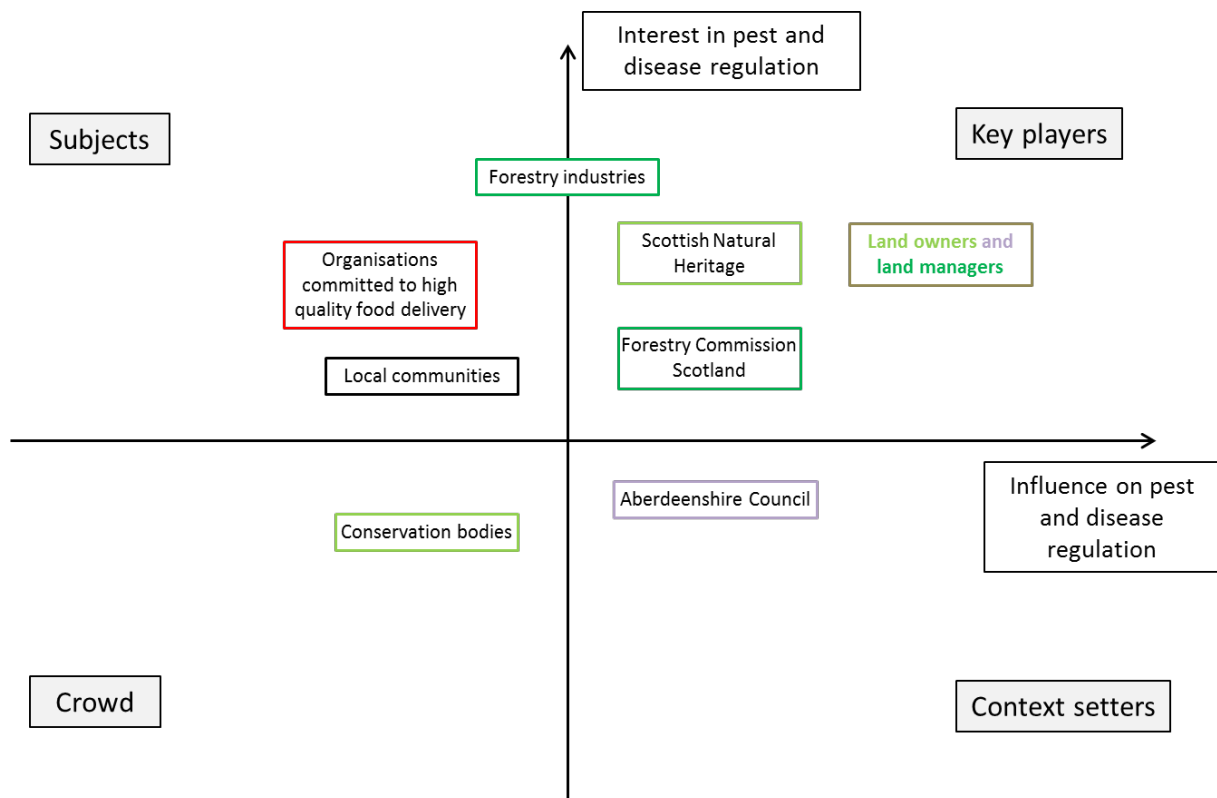
Figure 27: Interest-influence grid of disease and pest regulation

Summary

From the outset we had selected those stakeholders and sectors we considered most relevant (see Stakeholder analysis). Hence, the same stakeholders appear in the different grids, but their position in the grid changes according to the ecosystem service. However, some stakeholders tend to occupy the same position in relation to all ecosystem services. For instance, there is a strong cluster of organisations such as SNH, SEPA and FCS which usually have a strong influence. This can be explained by their statutory mission, their similar goals and their support to the Scottish Government strategies. The success of the implementation of the RLUP will strongly depend on their support and their actions.

Due to its multiple remits, Aberdeenshire Council represents a particular key stakeholder. This particularity gives it a potential influence upon almost all the ecosystem services and depending on the targets it will choose to respond to, it will have to make trade-offs that will affect the delivery of the ecosystem services.

Land owners are key players for most of the ecosystem services. Thus it should be a priority to engage with them, either directly or through their representative organisations such as Scottish Land & Estates. Their participation and their support to the implementation of the Regional Land Use Pilot project will be key to success. However, land owners are a category containing many different stakeholders and thus many different interests and objectives. To gain a better understanding of their motivations and drivers

it is necessary to divide this group into more specific stakeholder groups. This would also reveal where there are interest conflicts and potential trade-offs to be made within the group of land owners.

Some stakeholders frequently occupy the position of subjects in relation to many ecosystem services. They are impacted by changes in ecosystem services, but have little influence over their delivery. Examples are local communities or tourism-based businesses. The benefits they receive from ecosystem services can be strongly affected by the decisions and actions taken by other stakeholders. Both the Land Use Strategy and Ecosystem Approaches emphasise the involvement of all relevant stakeholders in decision making. Accordingly there is a need to recognize the importance of such stakeholders and to identify sectors which could be competing with their social or economic welfare. In addition, tourism represents a major activity in Aberdeenshire, and a significant source of income currently contributing £ 547 million per annum to the Aberdeen and Grampian economy. Despite not figuring as key players with regard to ecosystem services, it is necessary to include tourism organisations in the discussion due to their economic importance.

In a workshop on the Regional Land Use Pilot and the Ecosystem Approach held on 28th June 2013 in Banchory in Aberdeenshire, participants discussed the importance and representation of the built environment in the Regional Land Use Pilot and its possible implications for carbon emissions reduction. Historic Scotland is part of the project board for the Aberdeenshire RLUP and is the only organisation representing the built environment involved so far, but others should be involved later. From the interest-influence grids it can be seen that the built environment, in the form of developers, often occupies the position of context setter with regard to the delivery of ecosystem services. This emphasises the significance of this sector and the need to engage with developers in order to ensure that future developments do not undermine the objectives and principles of the Regional Land Use Pilot. It is important to think about the contributions this sector could bring to the RLUP and to climate mitigation and adaptation strategies and to involve it more in the RLUP.

Another business sector which seems to have a strong influence on the delivery of some ecosystem services is the oil and gas industry. It is a context setter for at least four ecosystem services (wildlife species diversity, environmental settings, climate regulation and hazards) and this emphasises the need to engage with the oil and gas industry to influence their practices and make them participate to the construction of a "greener Scotland".

This study highlights the need to think about how to engage with stakeholders. Depending on the category they belong to (key players, context setters, subjects or crowds), the approach will have to be different and adapted to their needs and interests. However, the stakeholder groups used in the analysis were very large and may thus hide differences within some of these groups such as land owners which could be split up into different types of landowners to allow for a more differentiated analysis. The stakeholders and the sectors highlighted in this study are the most obvious and the most relevant for the delivery of ecosystem services. However, in order to be fully inclusive of all relevant sectors of society as advocated in the 12 Malawi principles of the Ecosystem approach, it is necessary to think afresh about "who's in" (Fish, 2011), and where we put boundaries and why. For instance, the cultural services represent a very wide and "hard to grasp" category, which has potentially multiple implications for many stakeholders, but whose effects on human well-being need further evidence

(Fish, 2011). This should mean that groups such as the health sector, youth officers, artists or collectors could be seen as additional relevant stakeholders.

c. Challenges, limitations and perspectives of the study

The first difficulty of this analysis arose from the sorting and grouping phases. Indeed, putting stakeholders in boxes is not easy considering that stakeholders can have multiple interests and activities. This means that boundaries between groups are often blurry between. For instance, Forestry Commission Scotland also represents the forestry industry as it has an agency called "Forestry Enterprise Scotland" oriented towards an economic activity.

It is likely that the categories designed to put stakeholders in boxes does not allow us to enlarge our vision and think creatively and is therefore not the most appropriate way in the context of an Ecosystem Approach. However, it offers a first framework for thinking about stakeholders in terms of ecosystem services delivery and to think about how best to approach them according to their relationship with ecosystem services. This can be discussed in a workshop with the stakeholders themselves, whose input could help enrich the grids and position the stakeholders in a way that is adapted to the Aberdeenshire context.

Instead of assigning stakeholders to categories they could be characterised by a series of attributes. The attributes could relate to their influence or their interest in the ecosystem services such as "land" to designate a land ownership; "social reliance"; "economic reliance"; "health"; "spiritual value"; "specific skill or knowledge for the management of this ecosystem service"; etc. This could be used as the basis for a network analysis which would illustrate the relationships between stakeholders; what brings them together; which characteristics are similar or how they relate to each other.

Another potential weakness of the study is that it has been based on written documents and may not reflect what happens in practice. It does not take into account the games of power between stakeholders in Aberdeenshire and the exhaustive list may not include all the relevant stakeholders. This list should be validated and supplemented by stakeholders. In addition, the interest-influence grids need to be ground-truthed by stakeholders, at a workshop for instance, to be more accurate. In this way missing stakeholders could be added and the relative interest or influence of stakeholders could be verified.

Finally, we decided not to distinguish between direct and indirect or positive and negative impacts in the matrices of stakeholders, but rather to use a simple classification where stakeholders affect or are affected by ecosystem services. Thus, the categories are very broad and include a large range of positive; negative; direct and indirect impacts without any distinction. This does not allow us to understand at first sight if the influence of a stakeholder is positive or negative. Thus, it is hard, without going through each case in detail to understand the role of a stakeholder on the delivery of ecosystem services. For more accuracy and to capture the complexity of the interactions between stakeholders and ecosystem services, the categories could be redefined and subdivided. This would also highlight the interest of using a visual tool such as a matrix with a colour code and facilitate the construction of the interest-influence grids.

3. Thinking about applying an Ecosystem Approach to the Regional Land use pilot

a. Analysis of the correspondence between the Regional Land Use Pilot, the Ecosystem Approach, the policies and the stakeholders

Correspondence between the Land use strategy and the Ecosystem Approach

The Land Use Strategy is well correlated with the Convention for Biological Diversity (CBD) Ecosystem Approach and generally integrates its principles in its own objectives and principles (Figures 28 and 29). However, temporal and spatial scales, such as described in the Malawi principles, tend to be difficult to integrate as there is no guideline to select the "appropriate" ones. The Land Use Strategy represents a very strategic document that could be, in practice, applied at every scale. The CBD Ecosystem Approach advocates decentralizing the management at the lowest appropriate scale to ensure that local interests are taken into account. The Scottish Government has chosen to decentralize at the regional level to include all relevant land uses and ensure that the regional framework takes a holistic approach (Scottish Government, 2013). In addition, the choice of a regional scale corresponds to the need to have a strong and legitimate organization piloting the project. Thus, the local authority, due to its democratic mandate and influence, represents the perfect candidate to implement the RLUP.

However, the choice of a regional scale can be questioned as political boundaries may not always be relevant. In the Banchory workshop, participants pointed out that they mainly relate to smaller spatial areas, especially in terms of identity. However, they also found it relevant to apply the Land Use Strategy at a regional scale as they highlighted the need to have a flexible framework, tailored at a local scale. The 7th Malawi principle emphasises the importance of applying the Ecosystem Approach at the spatial scale appropriate to the objectives, which widens the window of possible scales. Indeed, the RLUP can be applied at a regional scale, but the identification of constraints and opportunities can be realised at a lower scale, by dividing the area into sub-regions (such as local focus areas), which may be more appropriate for this step. Thus, the RLUP could work across scales and be adapted to local circumstances.

	Delivering multiple benefits	Partnership with nature	Linking people with the land
The objectives of management of land, water and living resources are matter of societal choice			X
Management should be decentralized to the lowest appropriate level			
Ecosystem managers should consider the effects (actual and potential) of their activities on adjacent and other ecosystems	X	X	
Recognizing the potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context	X		
Conservation of ecosystem structure and functioning, in order to maintain ecosystem services should be a priority target of the Ecosystem Approach		X	
Ecosystems should be managed within the limits of their functioning	X	X	
The Ecosystem Approach should be undetaken at the appropriate spatial and temporal scales			
Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term			
Management must recognize that change is inevitable	X	X	X
The Ecosystem Approach should seek for the appropriate balance between, and integration of, conservation and use of biological diversity	X		
The Ecosystem Approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices			X
The Ecosystem Approach should involve all relevant sectors of society and scientific disciplines	X		X

Figure 28: Comparison between the 12 Malawi Principles and the Scottish Government Ecosystem Approach Principles underpinning the Land Use Strategy

Regarding the temporal scale, the Malawi principles do not state what should be the most appropriate one, but recommends that objectives for ecosystem management should be set for the long term. A lifespan of 10 years has been chosen for the RLUP with a broad vision for land use up to 20 years. However, this lifespan can be very flexible and adapted to the strategy of the Local Authority to consider all land uses. When asked, some participants of the Banchory workshop said that they set their objectives for the long term as they intended to last long, but that growing uncertainties concerning the future hindered their ability to plan. The RLUP should give land owners and land managers the tools to adapt and plan for the long term as advocated in the 8th Malawi principle for an Ecosystem Approach by being dynamic and flexible and taking account of changing circumstances such as grants regimes, livestock prices or land owners preferences and cumulative impacts of land use change (Scottish Government, 2013). The stakeholders invited to the workshop in Banchory said they are

hoping to see a simple and easy framework, which will allow them to take part in it and which will suit the local context.

The objectives of the RLUP also fit with the CBD Ecosystem Approach and include almost all its principles. Indeed, the regional framework should be prepared in partnership with all locally relevant land use sectors and should include a consultation step where key stakeholders and their representatives will be invited to get involved and give an input on the regional framework. These objectives contribute to meeting the 2nd, the 11th and the 12th principles of the Ecosystem Approach.

The second stage of the creation of the regional framework consists of assessing how natural resources can better deliver policy objectives and maximize the benefits for health and well-being, and how policy objectives can improve the delivery of ecosystem services. This objective supports the 5th, 6th and 10th principles of the EcA. It also supports the goal of this study, which is to understand how policies interact with ecosystem services and which complementarities and conflicts could emerge from their combination.

Malawi principles vs. LUS principles	The objectives of management of land, water and living resources are matter of societal choice	Management should be decentralized to the lowest appropriate level	Ecosystem managers should consider the effects (actual and potential) of their activities on adjacent and other ecosystems	Recognizing the potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context	Conservation of ecosystem structure and functioning, in order to maintain ecosystem services should be a priority target of the Ecosystem Approach	Ecosystems should be managed within the limits of their functioning	The Ecosystem Approach should be undertaken at the appropriate spatial and temporal scales	Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term	Management must recognize that change is	The Ecosystem Approach should seek for the appropriate balance between, and integration of, conservation and use of biological diversity	The Ecosystem Approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices	The Ecosystem Approach should involve all relevant sectors of society and scientific disciplines
Opportunities for land use to deliver multiple benefits should be encouraged					X	X						
Regulation should continue to protect essential public interests whilst placing as light a burden on businesses as is consistent with achieving its purpose. Incentives should be efficient and cost-effectives	X			X								
Where land is highly suitable for a primary use (for example food production, flood management, water catchment management and carbon storage) this value should be recognised in decision-making				X		X						
Land use decisions should be informed by an understanding of the functioning of the ecosystems which they affect in order to maintain the benefits of the ecosystem services which they provide			X		X	X	X		X	X		
Landscape change should be managed positively and sympathetically, considering the implications of change at a scale appropriate to the landscape in question, given that all Scotland's landscapes are important to our sense of identity and to our individual and social wellbeing	X				X		X					
Land-use decisions should be informed by an understanding of the opportunities and threats brought about by the changing climate. Greenhouse gas emissions associated with land use should be reduced and land should continue to contribute to delivering climate change adaptation and mitigation objectives					X				X			
Where land has ceased to fulfil a useful function because it is derelict or vacant, this represents a significant loss of economic potential and amenity for the community concerned. It should be a priority to examine options for restoring all such land to economically, socially or environmentally productive uses	X				X							
Outdoor recreation opportunities and public access to land should be encouraged, along with the provision of accessible green space close to where people live, given their importance for health and well-being	X				X							
People should have opportunities to contribute to debates and decisions about land use and management decisions which affect their lives and their future	X										X	X
Opportunities to broaden our understanding of the links between land use and daily living should be encouraged												

Figure 29: Comparison between the 12 Malawi Principles and the Principles of the Land Use Strategy

Correspondence between the policies and the land use strategy

The policies and the Land Use Strategy are generally well correlated (Figure 30). Almost all the ambiguous policies should help meet the objectives of the LUS. The indirect or very indirect/neutral policy instruments mostly fit with only one of the LUS objectives, except for some exceptions such as the Scottish Adaptation Framework or the European Landscape Convention, 2000. The supportive policies generally contribute to meeting 2 or 3 objectives of the LUS. There is no policy that does not

● ● ●

help deliver the LUS. This illustrates the fact that the LUS is more than an ecosystem services assessment and that policies can contribute in different ways to their delivery.

	Delivering multiple benefits	Partnership with nature	Linking people with the land
National Planning Framework 2	X	X	X
The Scottish Government's rationale for woodland expansion	X	X	X
Recipe for Success - Scotland's National Food and Drink Policy	X		X
Whole Farm Review Scheme	X		
Policy on Woodland Removal	X	X	X
Farming for a Better Climate	X	X	X
Our Rural Future	X	X	X
Cross-Compliance Guidance	X	X	X
Wildlife and Natural Environment (Scotland) Act 2011		X	
Scottish Outdoor Access Code			X
Scottish Adaptation Framework	X	X	X
Scottish Historic Environment Policy		X	X
The Water Environment and Water Services (Scotland) Act 2003		X	
Pollution Prevention and Control (Scotland) Regulations 2012	X		
Crofting Reform (Scotland) Act 2010	X		X
Scottish Planning Policy 6	X	X	X
Marine (Scotland) Act 2010		X	
A Low Carbon economic Strategy for Scotland	X		X
Low Carbon Scotland: Public Engagement Strategy			X
Low Carbon Scotland: Meeting the Emissions Reduction Targets 2013-2027	X	X	X
The Scottish Forestry Strategy	X	X	X
The Right Tree at the Right Place	X	X	
Woods in and Around Towns	X	X	X
SNH - Strategic Locational Guidance for Onshore Windfarms in respect of the Natural Heritage	X	X	
Flood Risk Management (Scotland) Act 2009		X	
Nature Conservation (Scotland) Act 2004		X	
Scottish Biodiversity Strategy		X	X
Scottish Soil Framework		X	
European Landscape Convention, 2000		X	X
National Marine Plan	X	X	X

Figure 30: Comparison between the policies and the Scottish Government Ecosystem Approach

Almost all the policy instruments also meet at least one of the principles of the Land Use Strategy (Figure 31). The three policies that do not meet any objectives, the "Wildlife and Natural Environment Act", the "Pollution Prevention and Control Act" and the "Nature Conservation Act" represent very

strategic documents that do not contain clear objectives which can be linked with any of the LUS principles. Even though these policies are committed to protect the environment, they do not encourage the delivery of multiple benefits; neither are they linked to climate change mitigation or landscape management. Nevertheless, the Land Use Strategy must take them into consideration as they provide a statutory and regulatory framework for wildlife and natural environment protection and pollution control. Their prescriptions can be integrated in the RLUP to ensure that it reflects Scottish Government policies. As all three policies are on a strategic level, it will be difficult to map them and more operational policies should be used instead. They may not be at the right level for the policy mapping; however, they can help create favourable conditions for the delivery of the LUS and the EcA. Indeed, these three policy instruments will contribute to meeting the LUS objectives and two of them meet the principles of the Ecosystem Approach (Figure 31). This highlights the fact that there is a need to establish a hierarchy between policies where policies from lower levels have to take into account or be compatible with other policies from higher levels. In this case, Acts represent the highest level of policy instruments and the LUS has to take them into account. Conversely, Acts do not necessarily have to integrate all the LUS principles, but they can help meet the objectives.

Two of the principles of the LUS are difficult to take into account and it is difficult to assess if they are supported by the policies without defining indicators of success as these principles are very abstract. None of the policies in the matrix meet the last principles of the LUS (Figure 31). Indeed, the policies that have been kept for the analysis correspond to policies that had a relatively obvious link with ecosystem services. Policies linked to communities' empowerment are still in process but will be integrated into the LUS and the RLUP and help meet the last principle.

Figure 31: Comparison between the policies and the Principles of the Land Use Strategy

LUS principles vs. policies	National Planning Framework 2	The Scottish Government's rationale for woodland expansion	Recipe for Success - Scotland's National Food and Drink Policy	Whole Farm Review Scheme	Policy on Woodland Removal	Farming for a Better Climate	Our Rural Future	Cross-Compliance Guidance	Wildlife and Natural Environment (Scotland) Act 2011	Scottish Outdoor Access Code	Scottish Adaptation Framework	Scottish Historic Environment Policy	The Water Environment and Water Services (Scotland) Act 2003	Pollution Prevention and Control (Scotland) Regulations 2012	Crofting Reform (Scotland) Act 2010	Scottish Planning Policy 6	Marine (Scotland) Act 2010	A Low Carbon economic Strategy for Scotland	Low Carbon Scotland: Meeting the Emissions Reduction Targets 2010-2022	The Scottish Forestry Strategy	The Right Tree at the Right Place	Woods in and Around Towns	SNH - Strategic Locational Guidance for Onshore Windfarms in respect of the Natural Heritage	Flood Risk Management (Scotland) Act 2009	Nature Conservation (Scotland) Act 2004	Scottish Biodiversity Strategy	Scottish Soil Framework	European Landscape Convention, 2000	National Marine Plan
Opportunities for land use to deliver multiple benefits should be encouraged	x	x		x	x	x		x				x	x			x	x			x	x	x			x	x	x	x	x
Regulation should continue to protect essential public interests whilst placing as light a burden on businesses as is consistent with achieving its purpose. Incentives should be efficient and cost-effectives																													
Where land is highly suitable for a primary use (for example food production, flood management, water catchment management and carbon storage) this value should be recognised in decision-making	x	x	x												x	x			x	x	x	x							x
Land use decisions should be informed by an understanding of the functioning of the ecosystems which they affect in order to maintain the benefits of the ecosystem services which they provide																													
Landscape change should be managed positively and sympathetically, considering the implications of change at a scale appropriate to the landscape in question, given that all Scotland's landscapes are important to our sense of identity and to our individual and social wellbeing	x	x			x							x				x				x	x	x	x					x	x
Land-use decisions should be informed by an understanding of the opportunities and threats brought about by the changing climate. Greenhouse gas emissions associated with land use should be reduced and land should continue to contribute to delivering climate change adaptation and mitigation objectives	x	x	x	x	x	x	x					x	x			x		x	x	x	x	x					x		x
Where land has ceased to fulfil a useful function because it is derelict or vacant, this represents a significant loss of economic potential and amenity for the community concerned. It should be a priority to examine options for restoring all such land to economically, socially or environmentally productive uses	x	x			x											x				x	x	x							
Outdoor recreation opportunities and public access to land should be encouraged, along with the provision of accessible green space close to where people live, given their importance for health and well-being	x	x								x		x				x				x	x	x				x			
People should have opportunities to contribute to debates and decisions about land use and management decisions which affect their lives and their future							x																						
Opportunities to broaden our understanding of the links between land use and daily living should be encouraged																													

Correspondence between the policies and the Ecosystem Approach

The principles of an Ecosystem Approach seem to be generally well embedded in the policies (Figure 32). Indeed, 17 out of 30 take at least two principles into consideration. It appears that policies tend to become more and more integrated and to take a more systemic approach, where they aim at integrating the three pillars of sustainability. The recognition of the benefits brought by the environment and especially by forests is increasingly anchored in people's mind, as was seen in the workshop held in Banchory.

In addition, numerous local initiatives, particularly in agriculture, have emerged in order to empower land managers and owners and to involve people in the management of their environment. For instance, the Scottish Government's approach seeks the maximum uptake of voluntary actions which both reduce avoidable emissions and improve farm performance, through schemes such as the "Whole Farm Review" or "Farming for a Better Climate". An increasing number of policy instruments focus on influencing people's behaviour, especially through incentives, although guidance and advice are also increasingly becoming part of the Scottish Government strategy. The challenge for the RLUP will be to achieve the 3rd proposal of the LUS which consists of aligning regulations and incentives with LUS objectives by taking into account the needs and opinions of stakeholders. In the Banchory workshop, participants argued that they need a flexible incentive scheme that would fit the local circumstances. Due to its local scale, the RLUP offers the opportunity to develop it in a way that responds to people's needs, addresses local issues and challenges and that will take into account the services that ecosystems provide. Another challenge arises from the existing schemes, such as Single Farm

Payment or SRDP: how to align them with the LUS? Is there a need to create a new incentive scheme that will be aligned, or that will encompass, the existing schemes?

Policy Document	Three main principles of the Ecosystem Approach		
	Consider natural systems	Take account of the services that ecosystems provide	Involve people
National Planning Framework 2	x	x	
The Scottish Government's rationale for woodland expansion	x	x	
Recipe for Success - Scotland's National Food and Drink Policy			x
Whole Farm Review Scheme			x
Policy on Woodland Removal	x	x	
Farming for a Better Climate	x	x	x
Our Rural Future			x
Cross-Compliance Guidance	x	x	x
Wildlife and Natural Environment (Scotland) Act 2011	x		
Scottish Outdoor Access Code		x	x
Scottish Adaptation Framework	x	x	x
Scottish Historic Environment Policy		x	
The Water Environment and Water Services (Scotland) Act 2003	x	x	
Pollution Prevention and Control (Scotland) Regulations 2012			
Crofting Reform (Scotland) Act 2010			x
Scottish Planning Policy 6	x	x	
Marine (Scotland) Act 2010	x		
A Low Carbon economic Strategy for Scotland			x
Low Carbon Scotland: Public Engagement Strategy			x
Low Carbon Scotland: Meeting the Emissions Reduction Targets 2013-2027		x	x
The Scottish Forestry Strategy	x	x	
The Right Tree at the Right Place	x	x	
Woods in and Around Towns	x	x	
SNH - Strategic Locational Guidance for Onshore Windfarms in respect of the Natural Heritage	x		
Flood Risk Management (Scotland) Act 2009	x	x	
Nature Conservation (Scotland) Act 2004	x		
Scottish Biodiversity Strategy	x	x	x
Scottish Soil Framework	x	x	
European Landscape Convention, 2000		x	
National Marine Plan	x	x	

Figure 32: Comparison between the 3 main principles of the Ecosystem Approach and the policies

Role of the stakeholders in the delivery of the Land Use strategy and the Ecosystem Approach

All the stakeholders will contribute to meeting the objectives of the LUS, which makes sense as the involvement of all relevant stakeholders represents one the keystones of this strategy. The LUS corresponds to a behavioural change, at the scale of the society, of all stakeholders more or less directly affected by land use management. Thus, by contributing to meeting the objectives of the LUS, the stakeholders listed in the matrix below, should contribute to delivering an Ecosystem Approach (Figure 33).

	Delivering multiple benefits	Partnership with nature	Linking people with the land
Aberdeenshire Council	X	X	X
Historic Scotland	X	X	X
Scottish Water	X	X	X
Forestry Commission Scotland	X	X	X
Scottish Environment Protection Agency	X	X	X
Scottish National Heritage	X	X	X
Transport Scotland	X		X
Scottish Enterprise	X		
Marine Scotland	X	X	
Visit Scotland	X		X
Ministry of Defence (Army)	X		
Organisations committed to high quality food delivery	X		
Forestry industries	X	X	X
Tourism-based businesses	X		
Renewable energy companies	X		
Land owners and land managers	X	X	X
Oil and gas industries	X		
Food processing industries	X		
Developers and building companies	X		X
Transport related businesses	X		
Fishery-based businesses (Marine and Freshwater)	X		
Organisations/groups committed to carbon reduction and energy savings	X	X	
Game management organisations	X	X	X
Recreational Organisations		X	X
Conservation Bodies		X	X
Community empowerment oriented groups		X	X
Local communities		X	X
Visitors/tourists		X	X

Figure 33: Comparison between the stakeholders and the objectives of the LUS

The public agencies represent the focus of the LUS and should be the initiators of the change. They all have the potential to help achieve the three objectives due to their high influence (see Stakeholders analysis). The third sector is more involved in the delivery of the 2nd and 3rd principle and will have a role to play with land-based businesses and local communities, especially in terms of guidance, advice

and awareness-raising that should help change people's behaviour. The private sector will have a strong role to play in the delivery of the first objective of the LUS by shifting its approach and adapting its practices to new political drivers and requirements, especially drivers and incentives. This is why it is very important to get their approval on incentives schemes to ensure their commitment to the RLUP. Land owners and land managers will be the key to success for the RLUP as their involvement in this project is likely to help meet the objectives of the LUS (Figure 33).

b. *Interest-influence grid of stakeholders in relation to the implementation of the RLUP*

The main public agencies represent the key players for the implementation of the RLUP as they are controlled by the Scottish Government and are required to take the LUS into account (Figure 34). The business sector is also strongly linked to the delivery of the RLUP and is represented by tourism-related organizations, renewable energy companies and developers. Indeed, tourism is major economic activity in Aberdeenshire, while renewable energy companies are likely to become more important as policies' focus on climate change mitigation and adaptation strengthens. In addition, there is a great potential for renewables in Aberdeenshire, and Aberdeenshire Council is committed to increase the use of renewable energy (Aberdeenshire-Council, 2010).
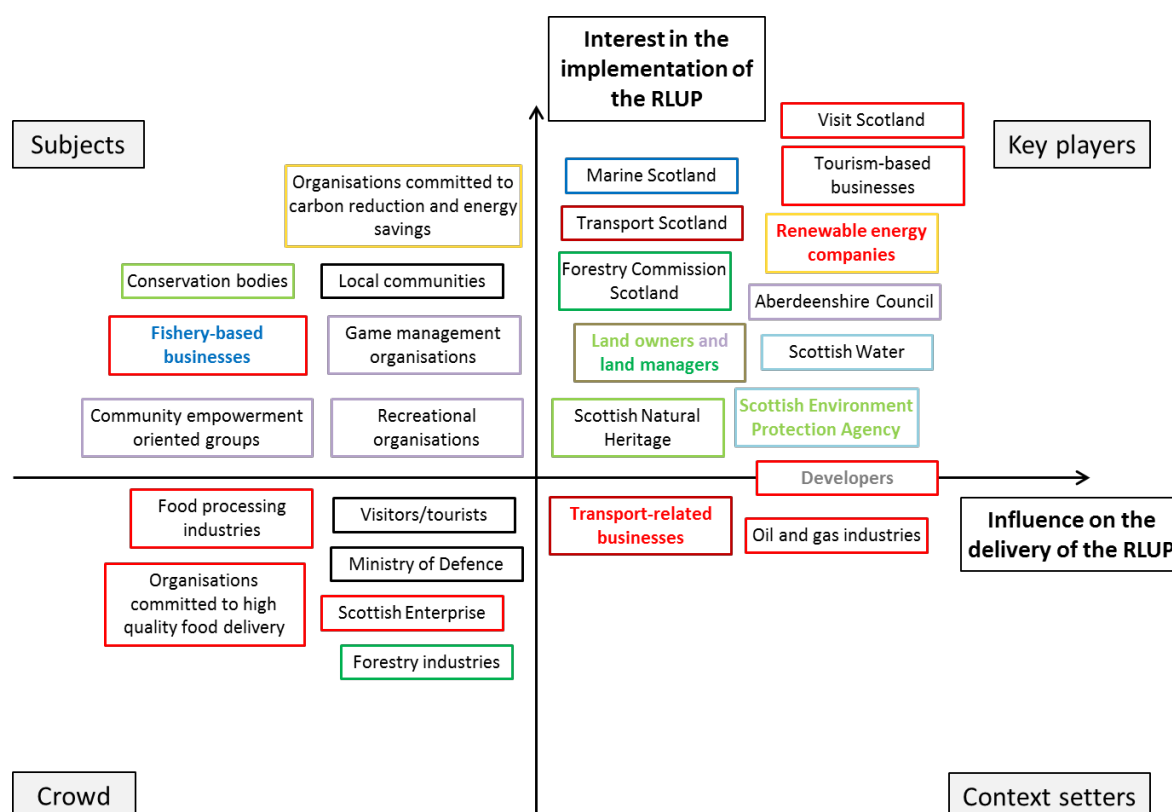

Figure 34: Interest-influence grid of the implementation of the RLUP

Land owners and land managers are also key players due to their important influence on land management and ecosystem services. In addition, involving them and ensuring their commitment to the LUS is one of the main focuses of the LUS (Scottish Government, 2011). Developers are necessary to link people with the land, as they will contribute to provide them sufficient homes. However, they should be influenced and encouraged to become supporters of the RLUP and be involved in its implementation.

The strategy to involve the key players or main supporters of the projects is through coalitions. The objectives of the LUS can only be achieved through collaborative work between these stakeholders who would represent the pillars of the RLUP.

Most of the 'subjects' in the interest-influence grid are represented by the third sector. In the context of the RLUP, their role is one of awareness-raising, influencing people's behaviour or political lobbying. They could be either involved in the identification of constraints and opportunities as their knowledge of local circumstances may be very helpful, or in the consultation phases. The goal is to empower these stakeholders as they could have a significant influence on people's mind-set and behaviour and could help improve the understanding or the acceptance of the RLUP project. Local communities are also part of the subjects group as they are likely to be affected by the implementation of the RLUP. They should be given the opportunity to participate in its implementation, as required in the LUS and EcA's principles and stated in the methodology of the RLUP.

Those stakeholders contained in the 'crowd' should be involved and influenced as well to ensure the success of the project. They may not be related directly to the RLUP, but as stated earlier in the report (see Stakeholder analysis), their influence or interest could change and they could become "opponents" to the project and hinder the delivery of the LUS and its objectives. These stakeholders, for instance visitors and tourists, can be influenced by either organizations from the third sector such as the Royal Society for the Protection of Birds or by public agencies such as Visit Scotland. Scottish Enterprise should be involved and empowered as it has the potential to reach and influence many businesses on issues linked to climate change for instance.

c.   *Challenges and limitations*

The matrices could be applied to any context as they do not take into account local circumstances. For future work, it will be interesting or necessary to actually consider the games of power between stakeholders and the weight of their activities in Aberdeenshire to assess their potential for the RLUP at the regional scale.

The influence and the interest of stakeholders have been deduced by using literature and websites of the organizations. Thus, the placement of the stakeholders in the interest-influence grids is partly a matter of interpretation and it needs to be ground-truthed and validated with the parties under consideration. This grid as well as the interest-influence grids of the ecosystem services could be presented to the participants at a workshop so that they could express their opinion about the relative location of stakeholders. This process is necessary to ensure that these grids reflect reality and to understand the actual relationships between stakeholders.

In addition, as for the policies, there are two levels of stakeholders: one more practical and local and the other more strategic (see stakeholder analysis). For this part of the study, we have put the focus on the most practical level by using the stakeholders that come from the second part of the study and are thus the ones most related to the ecosystem services. However, as the Ecosystem Approach and the RLUP are broader than just an Ecosystem Services Assessment, there is a layer of stakeholders that is missing and that should be taken into consideration. For future work, an interest-influence grid could be built including all the stakeholders recorded in the exhaustive list. The placement of stakeholders in the grid could be done more precisely by trying to quantify the influence of stakeholders beforehand (Figure 35). This process can help us understand what the role of each stakeholder is, how they could be involved in the RLUP and how they could contribute to its delivery.

Stakeholders	Influence			Source of influence					
	Coercive	Utilitarian	Normative	The legitimacy of an organisation	The number of members or spokespeole	The wealth of a stakeholder or its financial power	The property rights of a stakeholder	The interactions and relationship with other (influent) organisations	Their scale of action/influence
Aberdeenshire Council	+++	++	++	+++	+++	++		+++	+++
Forestry Commission Scotland	+++		++	+++					
Historic Scotland									
Scottish Water									
Scottish Environment Protection Agency									

Figure 35: Example of quantification of the influence

Finally, the most important drawback of this part of the study is that most of it is based on interpretation. Indeed, the matrices express the potential correspondence between the LUS; the EcA; the policies and the stakeholders. To determine if the RLUP has effectively applied an Ecosystem Approach and to assess the actual impacts and the success of the delivery of this project, it will be necessary to use indicators. The Scottish Environment Protection Agency has developed a self-assessment questionnaire on an Ecosystem Approach addressed to policy-makers, which could be used or adapted in the context of the RLUP. Some indicators have also been defined by Andrade Perez (2008: 16-22), for a case study in Latin America and could be adapted to the regional context of Aberdeenshire.

CONCLUSION

The set of relevant policies used for the analysis was composed of very heterogeneous policy instruments that do not all contain the same level of details on their objectives and the way they intend to achieve them. Thanks to the policy analysis, we could distinguish four types of policies - supportive, indirectly supportive, neutral and ambiguous - determined according to the impacts they have on the delivery of ecosystem services. These four types correspond to different levels of interactions with the natural environment with one level strongly connected and having more direct impacts on the delivery of ecosystem services and another level acting more indirectly on ecosystem services. The latter contributes indirectly to the delivery of ecosystem services by setting up a favourable context. Indeed, these policies may not be at the "right" level for an Ecosystem Services Assessment, but the correspondence matrices show that they can potentially contribute to the delivery of the Ecosystem Approach and to meeting the objectives of the Land Use Strategy.

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Most of the policies analysed for the complementarities and conflicts part have synergistic objectives, especially regarding climate change mitigation and adaptation and woodland cover expansion. Conflicts appear when these policies are operationalized and implemented. Thus, the delivery of ecosystem services will imply hard trade-offs between ecosystem services but also between policies' objectives. It will be necessary to understand how policies' objectives and impacts balance each other in order to make decisions over land management.

The stakeholders have been classified into four types – the public sector; the private sector; the third sector and local communities/visitors/tourists – which show different patterns of interactions with ecosystem services. It appears that the public sector and the third sector mostly affect the delivery of ecosystem services, whereas the private sector and local communities, visitors and tourists are strongly affected or dependent on it. However, the private sector can also have a significant influence on the delivery of ecosystem services, especially land owners and land managers and the built environment, through developers. Indeed, the interest-influence matrices show that land owners are key players for the majority of the ecosystem services and that the built environment sector, through developers, is often involved in the delivery of ecosystem services. This highlights the need to prioritise engaging with these stakeholders and ensuring their support for the Regional Land Use Pilot to guarantee the success of its delivery.

The matrices illustrate who could be involved in the RLUP but they don't indicate how these stakeholders are involved or the impact of power relationships within or between groups in practice.

The study also emphasises the necessity to adapt the engagement strategy with stakeholders depending on their relationship with the ecosystem services and with the RLUP. The goal of the RLUP would be to empower the subjects, such as local communities, who are likely to be strongly affected by the delivery of the RLUP and the ecosystem services; to favour collaboration between the key players or to influence the behaviour of some of them; to influence the behaviour of the context setters and to involve the crowd.

The comparison matrices showed that there was a clear correlation between the Land Use Strategy objectives and principles; the Ecosystem Approach; the policies and the stakeholders. Implementing the LUS at the appropriate spatial and temporal scale appears to be one the difficulties inherent to applying an Ecosystem Approach. The matrices also put the stress on the necessity to understand the role of stakeholders in implementing the RLUP by using an EcA and to define clearly how stakeholders will have to be approached.

It is important to consider that the study is a desktop analysis and that all the results emerging from it are based on an expert opinion with a strong interpretative dimension. Thus, the impacts of the policies or of the stakeholders on ecosystem services represent potential impacts and the relationships found in the analysis amongst components likewise correspond to potential interactions. In addition, considering the short timescale of the study, many decisions have been made in order to simplify the analysis. These have strongly influenced and shaped the results. The categories of stakeholders are very broad and do not allow a very subtle analysis. Furthermore, as for the policies, it appears that there are two levels of stakeholders, with one level strongly related to the delivery of ecosystem services and one level that has been excluded of the analysis as they are too indirectly linked with it. However, the

stakeholders belonging to the latter category may be very relevant in the context of the RLUP and the EcA and it might be appropriate to involve them to be fully inclusive of all the sectors.

The policy analysis has highlighted the fact that half of the policies included in the list of relevant policies were not at the right level to conduct an Ecosystem Services Assessment. Thus, Aberdeenshire Council should consider taking into account more operational documents, with direct links with the ecosystem services. These documents are very likely to be conflicting, but it is necessary to recognise that hard trade-offs cannot be avoided. In addition, considering that rural areas represent key areas for the RLUP, the Common Agricultural Policy and the SRDP have to be included as they represent the pillars of rural development.

Furthermore, as the first phase of the RLUP corresponds to an Ecosystem Services Assessment, the engagement strategy of Aberdeenshire Council will have to be based on an understanding of how stakeholders relate to the ecosystem services. However, the LUS is more than an assessment but the principles of the LUS should help focus on achieving the wider policy objectives around linking people with their environment and land use.

To conclude, there are two levels of policies and stakeholders to consider for the implementation of the RLUP, the strategic and the operational. Both of them will help deliver the project and the Ecosystem Approach and it is important to understand how they fall within the RLUP and which contribution they can bring to ensure the success of the project.

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