

A FRAMEWORK FOR INTEGRATED LAND AND LANDSCAPE MANAGEMENT

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ABSTRACT

Ireland’s natural environment is an inheritance for present and future generations. Protecting and managing this inheritance is particularly demanding in the context of the climate crisis, stressed water resources, declining biodiversity and the Covid-19 pandemic. Getting the balance between our current and future food and economic needs, and achieving environmental sustainability, if not regeneration, is an existential challenge. While there are different ways of meeting this challenge, undoubtedly one way is developing and utilising a systems approach that takes account of all relevant aspects in an integrated manner.

Commonly, there is a tendency to treat each component of the environment as siloes, dealt with by particular specialists and organisations. While this is understandable and will have continuing benefits, it is not adequate and will not ensure that our inheritance is maintained and enhanced.

We live in an interconnected world. More specifically, all the components of our natural environment – air, water, ecosystems, soils, rocks, land, landscapes – are interrelated and interlinked. Therefore, management of these components, in the context of society’s needs for nourishing food, good health and economic wellbeing, must take account of the linkages and must be undertaken in a cohesive, holistic and integrated manner. Otherwise, our natural environment will continue to decline, and our protection efforts will not be either efficient or effective.

An Fóram Uisce (2021) is proposing the adoption of a systems approach in the form of a Framework for Integrated Land and Landscape Management that enables inclusion of all the relevant aspects in a cohesive and unified manner.

The Framework for Integrated Land and Landscape Management (FILLM) builds on and is a reframing of the Integrated Catchment Management (ICM) approach used in water resources management. However, it is broadened to include the other components of our natural environment, while retaining catchments as the appropriate landscape units. In the process, FILLM becomes the overarching framework for environmental management as a means of connecting several directives and activities, for instance, the Water Framework Directive, Urban Waste Water Treatment Directive, Habitats Directive, Floods Directive, Drinking Water Directive, climate change adaption and mitigation, soil conservation, spatial planning, and sustainable food and timber production. In addition, it is a means of achieving the UN Sustainability Goals for 2030.

Ultimately, it is the implementation of measures and actions that are key to attaining the various environmental outcomes for water, air and ecosystems. Acceptance and use of the FILLM approach by policy makers, public bodies with an environmental remit and local communities encourages consideration of co-benefits, identification of synergies and can facilitate trade-offs where synergies are not feasible. Therefore, the approach helps ensure optimum results for the efforts and resources used.

INTRODUCTION AND RATIONALE

Our natural capital in Ireland, the foundation of our social, economic and health wellbeing, is being challenged on several fronts by human activities. Our water quality is not improving as required by the EU Water Framework Directive (WFD) and is slightly disimproving, biodiversity is declining and the increasing greenhouse gas (GHG) emissions and associated climate crises is the biggest environmental treat facing Irish society. At the same time the population is increasing. Hence maintaining safe, secure and stable water supplies and managing our wastes is challenging, and there is a need for a sustainable and resilient food production system.

These issues are interconnected. For instance, the changing climate regime has consequences for our water resources (quantity and quality), for ecosystems, for food production and for our health and wellbeing. Declining ecosystems and soil quality impinge on carbon sequestration and our resilience to cope with climate generated impacts. We also have many positive features, unspoilt areas, high quality food production and many catchments with good quality water resources, all of which are beneficial to people as well as the economy. Measures and actions are needed to protect our environment where it is satisfactory and mitigate the impacts where it is under threat or is unsatisfactory. It is now clear that many of the necessary measures and actions undertaken or planned for one component of the environment have co-benefits for other components because of the connectedness of nature. Therefore, there is an opportunity to adopt a systems approach to environmental management that takes account of all the environmental components and requirements in an integrated manner as a means of delivering effective and efficient outcomes for the environment and Irish society.

There has been a tendency in the past to consider and manage all the environmental components – water quality and quantity, air and climate, habitats and biodiversity, landscape, soils and geological materials – as separate entities, usually with specific public bodies having responsibilities for them. This is now being replaced by a view that a more holistic and integrated approach that links all the components (Figure 1), as well as the interaction with human activities, is needed.

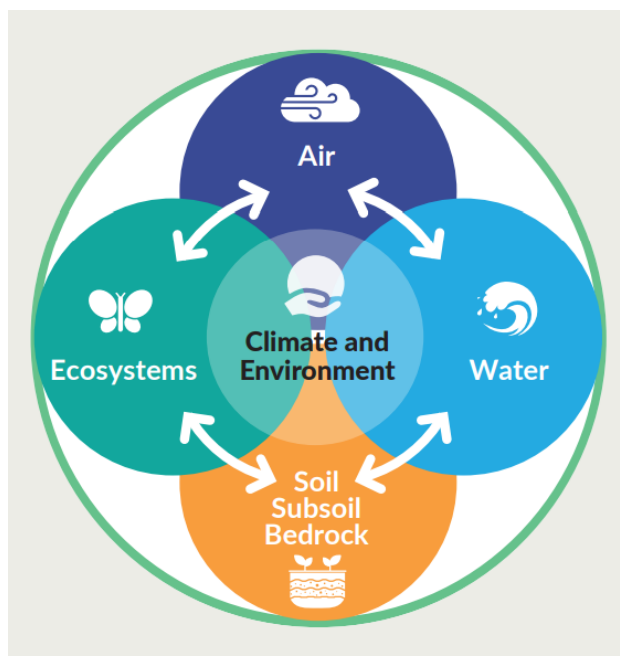


Figure 1: Illustration of the ‘whole of environment’ components and linkages (Copied from An Fóram Uisce, 2021)

Many of the key issues we now face are complex problems involving multiple pressures acting in combination, and therefore require action with multiple sectors. The adaptation of systems thinking¹ and the systems approach in environmental management allows for ecosystems, geosystems and atmospheric systems, as illustrated in Figure 2, to be considered holistically.

Deliberations and recommendations at both international and national level such as the UN Sustainability Goals, the EU vision of ‘living well within the limits of our planet’, the EU Green Deal and the seven key environmental actions recommended by the Environment Protection Agency (EPA) suggest that such a different approach to environmental management is required to achieve successful outcomes.

Suggested requirements include:

- Policy coherence and policy integration, that potentially require transformative change at government level and within and between public bodies.
- Taking a whole systems approach which requires a multi-disciplinary, multi-objective and multi-stakeholder framework supporting a balanced evaluation of all relevant issues.
- Making the linkages between the environmental components and human activities and taking account of the benefits (co-benefits), disbenefits and trade-offs.
- A spatial planning system that takes account of all environmental components in a holistic, cohesive way. Reduced compartmentalisation of planning and actions within the various environmental components is needed, as cross-component planning can deliver benefits in terms of cost-efficiency and environmental effectiveness.
- Connecting the requirements and implementation of the various Directives, such as the WFD, Habitats, Birds, Floods, Drinking Water, Marine Strategy Framework, Nitrates and Urban Waste Water Treatment and of policies such as Common Agricultural Policy (CAP), European Landscape Convention, climate change and forestry.
- A means of delivering on and balancing multiple objectives, while managing synergies and trade-offs in a transparent way.
- An evaluation of land suitability for various activities, including food production and provision of environmental services.
- Taking a collaborative place-based approach working across all relevant sectors in partnership at local and national level.

INTEGRATED CATCHMENT MANAGEMENT

The EU Water Framework Directive (WFD)² is the corner-stone of European water policy. It has provided the structure for integrated water resource management across the European Union over the last 20 years. The central concept to the WFD is **integration** as this is seen as key to the management and protection of water within river basin districts. This includes integration of, for instance:

- i) All water resources combining fresh surface water and groundwater, wetlands and coastal water resources at the catchment scale;
- ii) Environmental objectives for water bodies;
- iii) Water uses, functions and values;
- iv) Disciplines and expertise;
- v) Stakeholders and civil society;
- vi) Measures to achieve the objectives; and
- vii) The different decision-making levels (local, regional and national) that influence water management.

¹ Richmond, B. (1994). Systems Dynamics/Systems Thinking: Let’s Just Get On With It. In: International Systems Dynamics Conference. Sterling, Scotland

² https://ec.europa.eu/environment/water/water-framework/index_en.html

The Integrated Catchment Management (ICM) approach was developed as the means of enabling the required integration. This is acknowledged in the River Basin Management Plan for Ireland 2018-2021³ as follows:

“A new approach to implementation known as ‘integrated catchment management’ is being used to support the development and implementation of the RBMP, using the catchment (an area that contributes water to a river and its tributaries, with all water ultimately running to a single outlet) as the means to bring together all public bodies, communities and businesses.”

Traditionally, the vision and definition of a catchment was based on it being an area formed by topography that contributes water to a river and its tributaries, with all water ultimately running to a single outlet. While this is accurate from a hydrological perspective, catchments can be defined and considered in a far broader and relevant way, as follows (Daly, 2017):

A catchment is a multi-functional, topographically-based, dynamic, multiple-scale socio-biophysical system; defined by over ground and underground hydrology; connecting land, water, ecosystems, geosystems, atmospheric systems and people; and used as a basis for environmental analysis, management and governance.

By utilising this concept and understanding of catchments, they become appropriate and effective landscape units for environmental management and land-use planning, as highlighted below:

- They connect water ‘from the mountains to the sea’ via over ground and underground pathways. In the process, all human activities in catchments are connected.
- They connect many habitats from mountainous to riverine to estuarine to coastal, particularly aquatic habitats.
- In terms of their landscape and history, catchments of both local and national rivers and streams are recognised generally, to a greater or lesser degree, by local communities as part of their ‘sense of place’. Features such as streams, associated habitats, holy wells, etc. are used by local communities for their enjoyment and wellbeing providing cultural ecosystem services. The intrinsic and relational connections provided by cultural ecosystem services create a unique appreciation of local nature among catchment communities for water features, habitats, fishing, etc.
- Catchments are being used internationally and in Ireland⁴ as the framework for natural capital (ecosystems, geosystems, atmospheric systems) accounting, and particularly for assessing ecosystem services (see Figure 2).
- Local government boundaries are not suitable for water and biodiversity management, catchments are.

ICM comprises a stepped process which has been applied in the development of Integrated Catchment Management plans as set out in Figure 3.

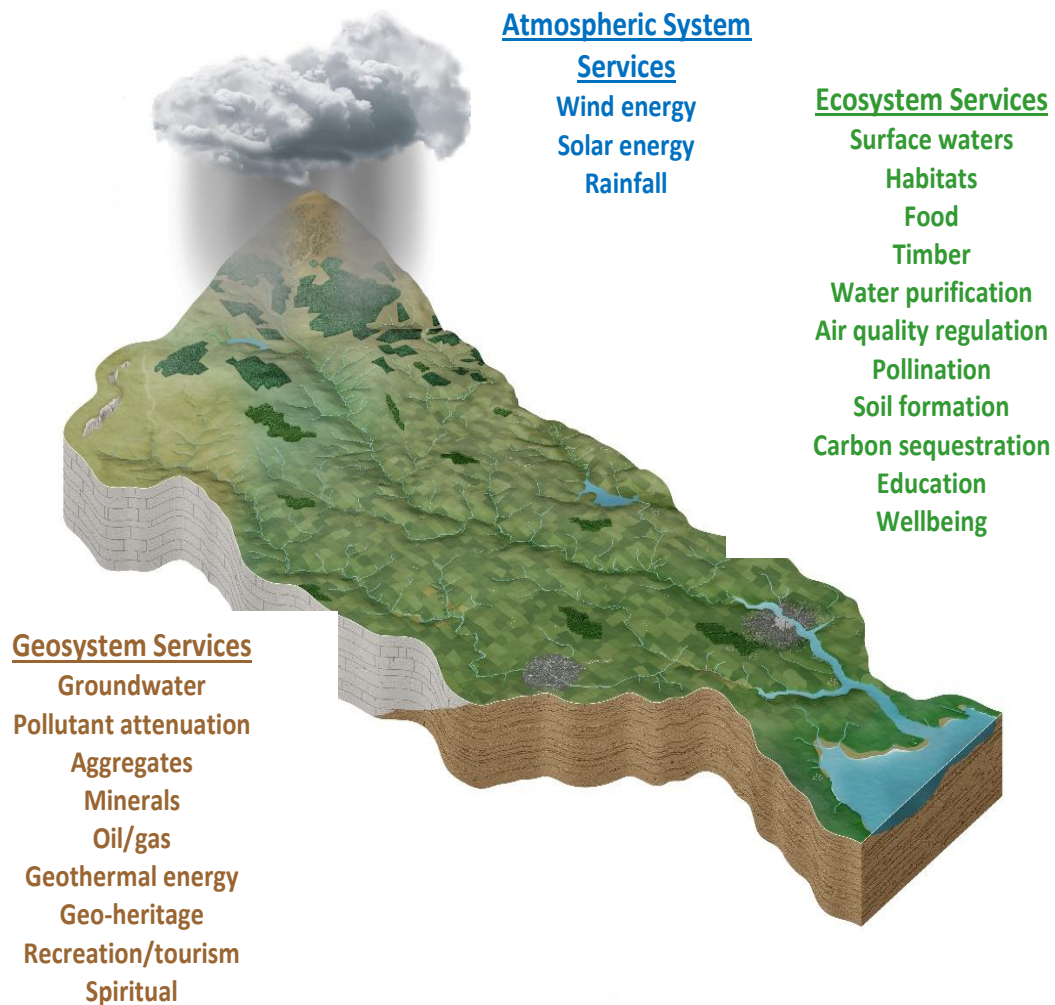
1. Identify key stakeholders. This local participation identifies issues of concern, encourages practice change and raises awareness of the issues and actions that are needed to attain environmental protection or improvements.
2. Create a community vision and potentially a community ‘plan’ for the catchment capturing local cultural ecosystem services and connecting people with their local stream, river, lake, coastal water, spring or borehole.
3. Getting the science right is achieved through catchment characterisation, using desk studies and field assessments to identify the causes and sources of pollution, critical source areas (CSAs), pollution load reductions and possible management strategies and mitigation options.
4. Identify and evaluate management strategies and mitigation options.

³ <https://www.housing.gov.ie/water/water-quality/river-basin-management-plans/river-basin-management-plan-2018-2021>

⁴ <https://www.incaseproject.com/about-the-project>

5. Select and agree appropriate measures, develop an implementation schedule and monitoring and set up engagement and communications strategies.
6. Implement the catchment action plan and communicate progress.
7. Evaluate progress, make necessary adjustments and communicate revised action plans.

The process requires close collaboration between relevant public bodies and a combination of ‘bottom-up’ and ‘top-down’ approaches. It involves awareness-raising, engagement and consultation with local communities. It presents a ‘new’ vision of a healthy, resilient, productive and valued water resource that supports vibrant communities.



Services Provided by Nature in Catchments

Figure 2: Schematic diagram of a catchment highlighting the three natural capital systems and the potential benefits provided by nature to people living in catchments. (Copied from An Fóram Uisce, 2021)

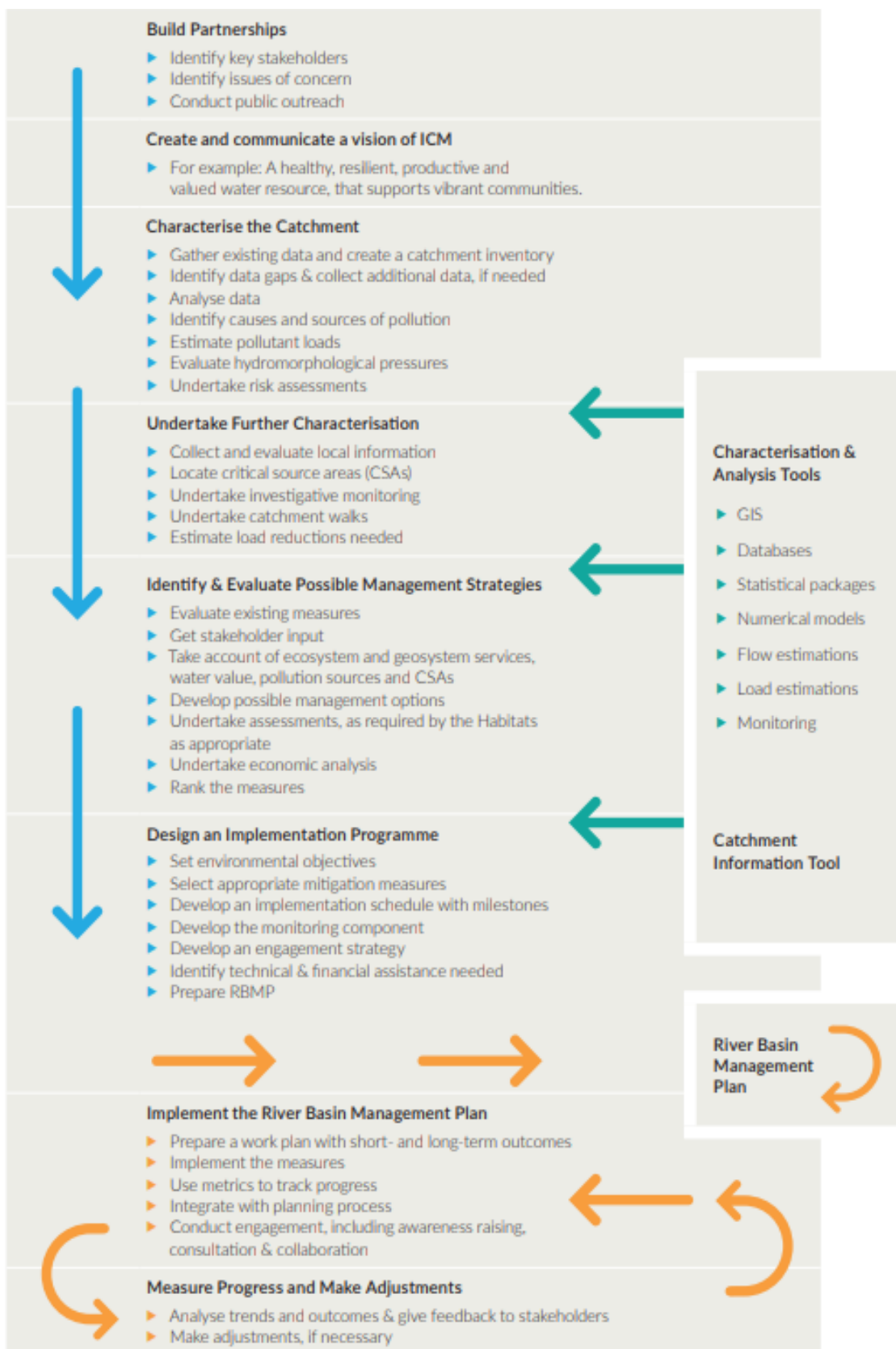


Figure 3: Steps in the integrated catchment management process (Adapted from Daly, et al., 2016)

REFRAMING ICM AS FILLM

In reviewing ICM and considering how our environmental objectives for water could be achieved, An Fóram Uisce concluded that there was scope for broadening it to include public participation, biodiversity and ecosystems, greenhouse gas emission reduction and carbon sequestration more explicitly and comprehensively, thereby connecting all the environmental components shown in Figure 1. In the process, this makes ICM a more powerful and relevant means of protecting and enhancing our environment and of achieving co-benefits from measures. ICM, as illustrated in Figure 3, has been rebranded as the Framework for Integrated Land and Landscape Management (FILLM) as shown in Figure 4. This amended approach addresses catchments as the landscape/spatial units in a holistic systemic-perspective, simultaneously focusing on the atmospheric system, the ecosystem and the geosystem. In this way, it aims to trigger a virtuous dynamic within and between all three systems in a coherent drive towards environmental enhancement.

When Figures 3 and 4 are compared, it is clear that the stages of FILLM are mirrored by the Steps of ICM, illustrating the close connections between the two. In addition, FILLM includes consideration of stakeholder engagement, GHG emission reduction and carbon sequestration at all stages. Also, the FILLM process can be used not only where water is the main receptor being considered (e.g. WFD implementation), but also where both terrestrial and aquatic ecosystems are the main receptor, such as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) (for Habitats Directive implementation).

WHY USE THE FILLM APPROACH?

- It provides a basis for a shared vision of land utilisation and management that includes all stakeholders, all human activities and all environmental components.
- It acknowledges ICM as an essential approach for successful water resources management and WFD implementation, and reframes it, as a critical driver for wider environmental protection and enhancement. For instance, FILLM is recommended as a structured approach for integrated ecosystem management.
- It makes environmental management more understandable and appealing to local communities because many householders and farmers ‘see’ the surrounding landscape as a mosaic of topographical, physical, ecological, cultural and infrastructural features and functions with no clear boundaries between them, particularly those that are the natural capital or components of an area.
- It provides the opportunity and encouragement for policy coherence and integration in land, landscape and nature management in a context where there are multiple environmental and socio-economic needs.
- It encourages different relevant disciplines and organisations to collaborate in the pursuit of mutually beneficial objectives.
- It takes account of situations where pressures that are seen to impact on one element of the environment in a catchment often impact on others, e.g. intensive farming can impact not only water quality, but also biodiversity, and can increase carbon and ammonia emissions unless actions are taken to mitigate impacts.
- It enables environmental management actions to be optimised in terms of cost-effectiveness and environmental benefits, takes account of trade-offs and helps avoid conflicts.
- It encourages a multifunctional approach to land-use, encompassing all the particular ecosystem, geosystem and atmospheric system services in a catchment area.
- It facilitates greater integration of resource use, including nutrient cycling, spatial distribution of ‘natural’ and productive land, and renewable energy generation and biofuels.
- It encourages identification of those situations in which management practices that achieve benefits for one environmental issue could conflict with the delivery of other environmental priorities so that such conflicts can be resolved.

- It enables agri-environmental and forestry environmental schemes to be considered as an integrated process.
- It discourages ‘one-off’ actions to deal with a singular environmental issues without consideration of the potential for ensuring optimum environmental benefits and cost-effectiveness.
- It encourages optimum location of protection and improvement measures, for example, planting of native woodlands as buffer zones alongside streams.
- It enables and encourages greater cooperation between different agencies, industries and civil society to more effectively plan and manage areas of mutual interest and resolve conflicts where “competing” interests (real or perceived) occur.
- It enables consideration of co-benefits from environmental management actions.

TO SUPPORT IMPLEMENTATION

An Fóram proposes the following:

1. That the Framework for Integrated Land and Landscape Management (FILLM) becomes the overarching framework for environmental management, as a means of connecting and achieving , for instance, the UN Sustainability Goals for 2030 and the Water Framework Directive, Urban Waste Water Treatment Directive, Habitats Directive, Floods Directive, Drinking Water Directive, the European Landscape Convention, climate change adaption and mitigation, soil conservation, and sustainable food production and land-use planning requirements.
2. That public engagement on a particular component of the environment, such as river basin management planning or ecosystem protection and enhancement or GHG emission reduction, should include consideration of all the environmental components in a holistic manner.
3. That the Programmes of Measures for water resources, biodiversity and climate change adaptation and mitigation should not be considered in a siloed manner, but rather as measures and actions that can achieve more than one objective and benefit as a means of optimising efficiency and effectiveness in terms of resource use and environmental outcomes, and as a means of considering trade-offs where synergies are not feasible.
4. That all relevant public bodies with an environmental remit, such as An Fóram Uisce, Department of Housing, Local Government and Heritage (DHLGH), Department of Agriculture, Food and the Marine (DAFM), Environmental Protection Agency (EPA), National Parks and Wildlife Services (NPWS), Local Authority Waters Programme (LAWPRO), Inland Fisheries Ireland (IFI), Geological Survey of Ireland (GSI) and local authorities, adopt the FILLM approach, including the multi-disciplinary and multi-organisational implications, in their vision and environmental management work as a means of achieving optimum efficiency and effectiveness.
5. That resources are allocated to allow these recommendations to be enabled.

CONCLUSIONS

Utilising the FILLM approach provides the opportunity for policy coherence and integration in land, landscape and nature management in a context where there are multiple environmental and socio-economic needs. It provides a basis for a shared vision of land utilisation and management that includes all stakeholders, all human activities and all environmental components. It encourages different relevant disciplines and organisations to collaborate in the pursuit of mutually beneficial objectives. It takes account of situations where pressures that are seen to impact on one element of the environment in a catchment often impact on others, e.g. intensive farming can impact not only water quality but also biodiversity, and can increase carbon and ammonia emissions unless actions are taken to mitigate impacts. It enables environmental management actions to be optimised in terms of cost-effectiveness and environmental benefits, takes account of trade-offs and helps avoid conflicts.

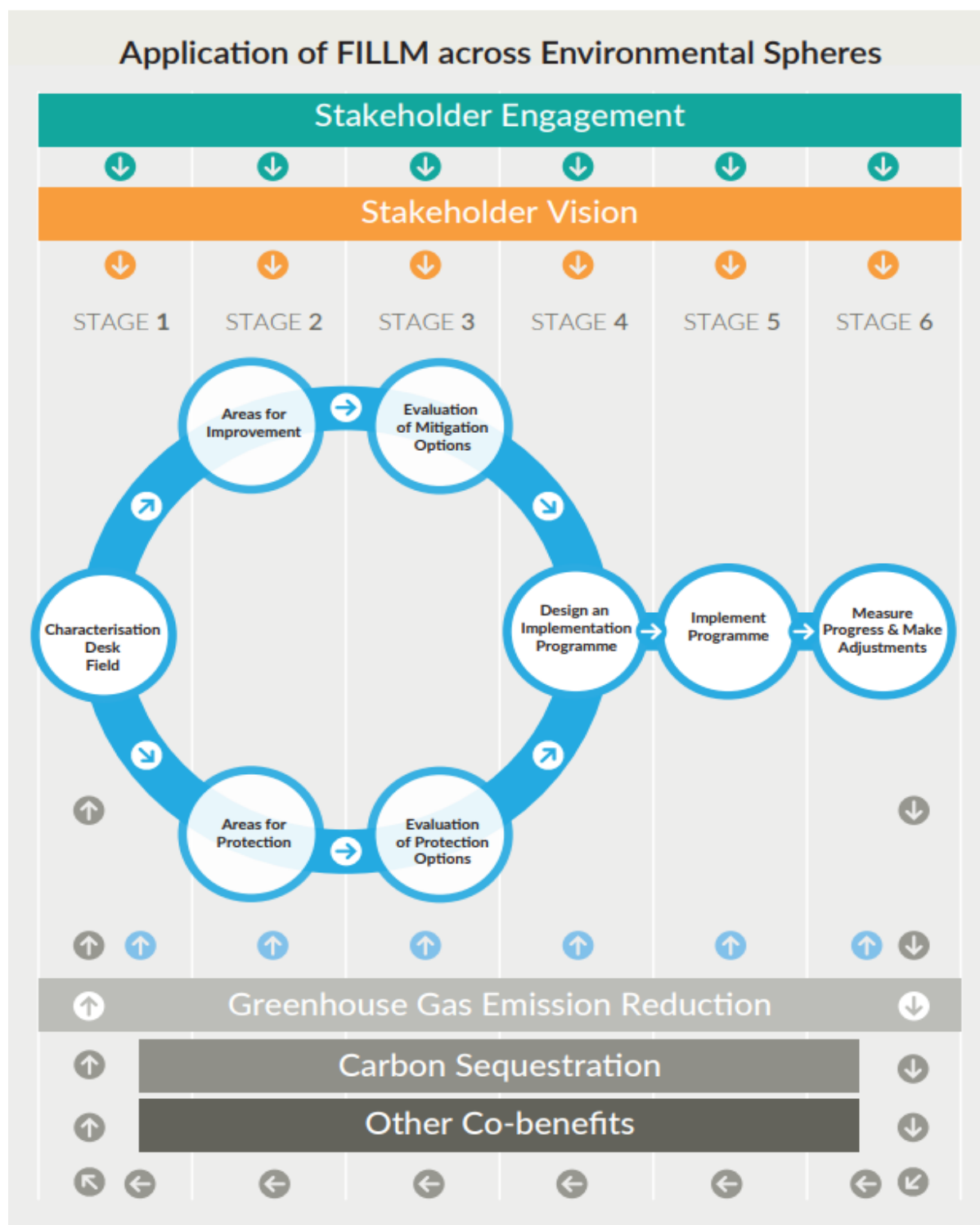


Figure 4. Stages in the application of FILLM to address all component systems. (Copied from An Fóram Uisce, 2021)

ACKNOWLEDGEMENTS

This paper is based on the work of Donal Daly and builds on experience gained implementing integrated catchment management in the 2nd WFD Cycle River Basin Management Programme. *The Framework for Integrated Land and Landscape Management* report, was produced and approved by the members of An Fóram Uisce – The Water Forum as a deliverable in its role as the only statutory

body representing all stakeholders with connections pertinent to water resource management. These include consumer, community and water sports groups, business and trade unions, environmental sector, Irish Water consumers, the group water scheme sector and a range of other sectors including education, agriculture, fisheries and forestry. The Forum is chaired by Dr Tom Collins.

An Fóram Uisce - The Water Forum was established as a statutory body in June 2018 to facilitate stakeholder engagement and debate on issues relating to water as a resource, water quality, rural water concerns, issues affecting customers of Irish Water and issues associated with the implementation of the Water Framework Directive.

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