
Assessing Governance Structures for Green Infrastructure¹

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Abstract

Green infrastructure is an emerging policy response to the continuous degradation of natural capital. In this paper we develop a framework that can be used for assessment of feasibility of current governance system for the purposes of green infrastructure policy. The key issues we found relevant for the analysis include: coverage of the regulation, its capacity to enhance landscape level management, flexibility in local implementation and mechanisms for accommodating diverging interests, adaptation of decision-making and robust monitoring. The paper also presents the key findings of our analysis on the feasibility of current governance system for green infrastructure policy in Finland.

Key words: Green infrastructure, ecosystem services, governance, regulation, assessment

1. Introduction

Ecosystems are under a great pressure from the intensive use of natural resources and land use changes. As a result biodiversity is on a decline, and many of the ecosystem services are degraded with negative impacts on human well-being.² Instead of focusing on protecting, improving and utilizing natural processes to gain economic and social benefits, we continue to use natural resources in an unsustainable manner and building expensive technical systems to provide same services that natural processes provide us for free leading to further degradation of the natural capital. Green infrastructure is an emerging policy response aiming to change this harmful pattern.³

The core of GI approach is to recognize that environmental recourses hold a tremendous potential for providing a wide range of ecosystem services and those recourses should be managed in a way that enables the various ecosystem uses and secures the provision of ecosystem services vital for human well-being.⁴ As environmental resources are only partially non-rival, meaning

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² The Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-Being: Synthesis. Island Press Washington DC.

³ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Green Infrastructure (GI) – Enhancing Europe’s Natural Capital COM(2013) 249 final

⁴ Id.

that after some point the consumption of resource by one user potentially diminishes the resource's capacity to support other users or uses, securing the provision of wide variety of goods and services derived from environmental resources requires managing the trade-offs among potentially competing rival uses.⁵

As EU commission points out, investing in natural capital has potential to contribute towards numerous policy objectives, such as improving human health and well-being, climate change adaptation and mitigation, environmental risk management, regional coherence etc. (COM 249/2013). In order to maximize the benefits that green infrastructure has potential to provide, systematic green infrastructure policies that cross ecosystem and sectoral boundaries and integrate GI approach into decision-making affecting the use of land and water is needed. Some countries have started the preparation of GI policies, while most countries do not have yet any systematic policies for GI. In order evaluate current governance system and to provide understanding how it should be developed, analytical tools for the assessment are needed. By governance system we mean legal and other institutional arrangements in which the implementation of green infrastructure policy will take place. The main focus is on relevant laws, although we are not limiting ourselves solely to the sphere of laws.

In this paper we aim to develop such a framework that can be used for assessment of feasibility of current governance system for the purposes of green infrastructure policy and apply the framework developed to assess the Finnish governance system. In our minds, green infrastructure is rather a policy regime than a single policy instrument. Natural elements and land-use pres-

ures shaping these elements, which should be addressed by green infrastructure policy, vary greatly in any given area. Hence, we believe that only a mix of instruments could adequately serve the goals of green infrastructure policy. We start the building of our framework by exploring the infrastructure theory proposed by Frischmann and identifying the main issues that need to be considered in developing regulation for green infrastructure according to his theory. However, there are some issues relevant for green infrastructure governance that infrastructure theory fails to take into account, so we continue to develop the framework further on.

The infrastructure theory is rooted in economic theories of law related to the issue, which regime of resources management, private property regime or an open access regime, best fits to the societal needs. Frischmann argues that for some classes of resources there are strong economic arguments for managing and sustaining resources in openly accessible way⁶ and we tend to agree with this general position. Another theoretical tradition relevant to us, is policy evaluation⁷. One stream among evaluation research, is evaluation of legislation.⁸ While evaluation of legislation can be seen as part of the general policy evaluation research, it is often seen as a part of the theory of legislation. Although this paper pays particular attention on laws, it differs from

⁶ B. Frischmann, *An Economic Theory of Infrastructure and Commons Management*. Minnesota Law Review, Vol. 89, pp. 917–1030, April 2005. Available at SSRN: <http://ssrn.com/abstract=588424>, p. 918–919.

⁷ See e.g. P. Rossi, H. Free, M. Lipsey, *Evaluation – A systematic approach*. Sage Publication. Thousands Oaks, 1979, E. Vedung *Public Policy and Programme Evaluation*. New Brunswick, Transaction Publishers, 1997.

⁸ J. Tala, *Lakien vaikutukset, Lakiuudistusten tavoitteet ja niiden toteutuminen lainsäädäntöteoreettisessa tarkastelussa*, Oikeuspoliittinen tutkimuslaitos, Helsinki 2001. J. Verschuuren (eds.) *The Impact of Legislation, A Critical Analysis of Ex Ante Evaluation*, Martinus Nijhoff Publishers 2009.

⁵ B. Frischmann, *Infrastructure. The Social Value of Shared Recourses*, 2012, p. 227.

traditional type of evaluation of legislation research in the sense that it focus at a regime level instead of the level of an individual law.

The paper is structured as follows: the section two gives a short introduction to the concept of green infrastructure and discusses existing and emerging policies and legal instruments for sustaining and enhancing green infrastructure. The third section takes the infrastructure theory developed by Frischmann as a starting point and explores what does it mean to consider environment as an infrastructure, and what kind of insights does such an approach provide for policy analysis. We then continue to develop a framework for assessment by identifying those issues and challenges relevant for green infrastructure governance that infrastructure theory does not cover. In section four we apply the framework and assess the feasibility of current governance system in Finland to manage green infrastructure resources. Hence, the section four is an illustration how the framework could be used and what kinds of results it could provide. Last section provides concluding remarks and discusses possible ways forward through changes in regulatory system.

2. What is green infrastructure and why do we need green infrastructure policy?

Green infrastructure is an emerging policy response to the continuous loss of biodiversity and associated ecosystem services. The term is relatively new and flexible, with no official definition.⁹ In this work we lean on definition used by European Commission. According to EU's Green Infrastructure Strategy GI is "a strategically planned network of natural and semi-natural areas with other environmental features designed

⁹ L. Mazza et al. Green Infrastructure Implementation and Efficiency. Final report for the European Commission, DG Environment on Contract ENV.B.2/SER/2010/0059, p. 7.

and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, GI is present in rural and urban settings."¹⁰

The concept is appearing more and more frequently in policy documents all over the world and some countries have taken steps towards systematic green infrastructure policies.¹¹ Though GI has been interpreted slightly differently depending on the context,¹² and no official definition exists as of yet, there seem to be consensus on key characteristics of what constitutes green infrastructure. The central idea behind the concept is the understanding of the natural environment as infrastructure, capable of delivering wide variety of essential ecosystem services. In addition, the term green infrastructure emphasizes the need for connecting natural areas and other open space to help the species to migrate into suitable habitats and to increase ecosystem resilience.¹³

There are only few examples on systematic policies for green infrastructure, but the legal and political framework for GI can be conceived from existing legal instruments and policies relevant for biodiversity and connectivity at international, regional and national level. At the international level the Convention on Biologi-

¹⁰ European Commission, *supra* note 3.

¹¹ For instance in France the Trame verte et bleue (TVB) is an example of a nationwide green infrastructure policy initiative. Barthod, C ja Deshayes M. (2009) Trame verte et bleue, the French green and blue infrastructure, European Commission workshop of Europe 25 – 6 March 2009 Bryssel. Available in <http://green-infrastructureeurope.org/download/8%209%20C%20Barthold%20M%20Deshayes%20The%20French%20Ecological%20Network.pdf>

¹² L. Mazza et al. *Supra* note 6.

¹³ M. Benedict & E. McMahon, Green infrastructure: Smart Conservation for the 21st Century. *Renewable Resources*, 2002(20), pp. 12–17.

cal Diversity (CBD),¹⁴ Convention on Migratory Species¹⁵ (CMS) Convention on Wetlands of International Importance Especially as Waterfowl Habitat¹⁶ (Ramsar Convention), and United Nations Framework Convention on Climate Change¹⁷ (UNFCCC) are amongst the relevant treaties that form the framework for GI policies at the international level. Especially target 11 of the Aichi targets developed under the CBD is of relevance: it states that by 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.¹⁸ At the European level the European Landscape Convention,¹⁹ and the Convention on Conservation of European Wildlife and Natural Habitats²⁰ (the Bern Convention), are essential building blocks of the framework for green infrastructure.

At the EU level green infrastructure is an integral part of the biodiversity policy. The target two of the EU Biodiversity Strategy to 2020 explicitly mentions the concept of green infrastructure and states that “by 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at

least 15 % of degraded ecosystems”.²¹ In addition to Biodiversity Strategy, there are several other policy documents including the EU Strategy on Adaptation to Climate Change²², Roadmap to Resource Efficient Europe²³, and Blueprint to Safeguard Europe’s Water Resources²⁴ that call for the development of green infrastructure. As a response to these documents commission adopted a Green Infrastructure Strategy in spring 2013. In the strategy commission highlights the potentiality of green infrastructure to contribute towards numerous EU policy objectives, ranging from increased human health and well-being, climate change adaptation and mitigation to improving resource efficiency. However, while acknowledging the need for systematic and comprehensive GI policies, the commission states that at this point the strategy is to be implemented within existing legislation and policy instruments.²⁵

At the EU level the Birds²⁶ and Habitats directives²⁷ are naturally important legal instru-

¹⁴ Convention on Biological Diversity (Rio de Janeiro, 1992),

¹⁵ Convention on Migratory Species (Bonn, 1979)

¹⁶ Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar 1971)

¹⁷ United Nations Framework Convention on Climate Change (New York 1992)

¹⁸ Convention on Biological Diversity COP decision X/2 on The Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets.

¹⁹ European Landscape Convention, (Firenze 2000)

²⁰ Convention on Conservation of European Wildlife and Natural Habitats (Bern 1979)

²¹ COM(2011)244 final. Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions. Our life insurance, our natural capital: an EU biodiversity strategy to 2020.

²² COM(2012)673 final Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. An EU Strategy on adaptation to climate change

²³ COM(2013)216 final. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Roadmap to a Resource Efficient Europe.

²⁴ COM(2011)571 final. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions A Blueprint to Safeguard Europe’s Water

²⁵ European Commission, *supra* note 3.

²⁶ Council Directive 79/409/EEC on the conservation of wild birds, OJ. 1979 L 103.

²⁷ Council Directive 92/43/EC on the Conservation of the Natural Habitats of Wild Fauna and Flora, OJ. 1992 L 206.

ments contributing towards protection of biodiversity and ecosystem services in the Europe. The backbone of these directives is the protection and management of the protected areas network (Natura 2000), but the directives also require the conservation of species and habitats of Community importance (as well as other migratory birds). However, these directives are not adequate, as green infrastructure requires measures in the wider landscape.²⁸ In addition to these nature conservation “backbone” directives, there are numerous other instruments relevant for supporting GI within EU. These include, among others the Water framework directive²⁹ and the Marine strategy framework directive³⁰, which provide a framework for sustaining and enhancing the quality of Europe’s “blue infrastructure”, by establishing a legal obligation to protect and restore the quality of waters and marine environment. Further the regulations of the Common Agricultural Policy (CAP), legislation on groundwater protection and flood risk management, are among the key substantive laws relevant for GI. At the procedural level the Environmental impact assessment directive³¹ (EIA) and Strategic environmental assessment directive³² (SEA) provide a basis for the integration of GI in the sectoral decision-making systems.

Effective implementation of these instruments is in the core of sustaining green infrastructure in Europe.³³

The Commission promotes member states to develop national GI strategies and to enhance policy integration to support GI.³⁴ There are already few examples on systematic, integrative GI policies at the Member State level. One of the initiatives includes the green and blue infrastructure called *Trame verte et bleue* (TVB) in France.³⁵ France has established legal rules on how to define and implement its green and blue infrastructure. France officially established the TVB -ecological network with the publication of a decree at the end of 2012.³⁶ As its core element, the decree foresees the elaboration of national guidance on the French ecological network. All planning documents and national projects such as the major linear infrastructures must be compatible with this guideline. Implementation is mainly the task of the regions, which have to work out regional ecological networks including maps and action plans (regional coherence schemes) as their main elements. The regional ecological networks have to be taken into account by all spatial planning tools.³⁷ While spatial planning is seen as a key instrument to implement the network, also other instruments such as agricultural subsidies and establishment of protected areas are used.³⁸

²⁸ European Commission, *supra* note 3.

²⁹ Directive of the European Parliament and of the Council 60/2000/EC Establishing a framework for community action in the field of water policy. OJ. 2000 L 327.

³⁰ Directive 2008/56/EC Of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy. OJ 2008 L 164/19

³¹ Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment OJ 2012 L 26/1

³² Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment OJ 2001 L 197

³³ European Commission, *supra* note 3.

³⁴ European Commission, *supra* note 3.

³⁵ C. Barthod & M. Deshayes, *Trame verte et bleue*, the French green and blue infrastructure, European Commission workshop of Europe 25 – 6 March 2009 Brussels. Available in <http://green-infrastructureeurope.org/download/8%209%20C%20Barthod%20M%20Deshayes%20The%20French%20Ecological%20Network.pdf>

³⁶ Décret n° 2012-1492 du 27 décembre 2012 relatif à la trame verte et bleue

³⁷ Décret n° 2012-1492 du 27 décembre 2012 relatif à la trame verte et bleue

³⁸ Id.

In order to assess whether existing regulatory regimes are consistent with the ideas of green infrastructure and sufficient to protect, sustain and create green infrastructure analytical tools for assessment are needed. Next chapter discusses the issues that should be considered in assessment and development of regulations for green infrastructure.

3. Developing an approach for the assessment of current governance system

Brett Frischmann has developed a theoretical account of infrastructure recourses and applied it to non-traditional infrastructure, including environmental recourses and intellectual infrastructure. According to Frischmann, natural environment plays similar functional role as traditional infrastructure in society: *“it functions instrumentally as an essential input for wide range of human and natural goods and services including agricultural output, human health and more amorphous goods such as quality of life, as well as purification of water and air, regulation of climate and maintenance of biodiversity”*.³⁹

According to Frischmann infrastructure resources satisfy the following criteria:

- The resource may be consumed nonrivalrously for some appreciable range of demand,
- Social demand for the recourse is driven primarily by downstream productive activity that requires the recourse as an input, and
- The recourse may be used as an input into wide range of goods and services, which may include private goods, public goods, and social goods.⁴⁰

As Frischmann argues, these criteria are satisfied when we take a look at environmental resources. In contrast to some non-renewable natural resources, environmental infrastructures are not purely rivalrous in consumption, but they are potentially (non)rival, meaning that those resources have finite, potentially renewable, and potentially sharable capacity. The second and third criteria focus the attention on the manner which infrastructure generates value for society, and the diversity of the outputs (private, public, social goods). The social value and demand for environmental infrastructure derives from those benefits and goods that contribute towards human well-being, which require the ecosystems as an input. These ecosystem goods and services are both private goods, public goods and social goods. Private goods include provisioning services like food and raw material, while many of the supporting and regulating services like water purification and nutrient climate regulation are public goods in nature. The cultural ecosystem services like recreation can be regarded as social goods.⁴¹

The key findings of Frischmann’s studies on infrastructure can be summarized as follows: 1) infrastructure resources generates value as inputs into variety of productive processes, 2) these processes often generate positive externalities to the benefit of the society as a whole, and that 3) managing such recourses as commons is often socially desirable because doing so supports these downstream activities.⁴²

In his theory Frischmann defines commons management as a situation in which a resource is accessible to all members of a community on nondiscriminatory terms.⁴³ From this perspective Frischmann criticizes the development of

³⁹ Frischmann, *supra* note 5 at p. 227.

⁴⁰ Id.

⁴¹ Id at pp. 234–240.

⁴² Id at p. 228.

⁴³ Id at p. 7.

market-based instruments that build on property regimes, for conservation and its financing. The problem with market-based approaches, as Frischmann argues, is that they lean on property regimes which may lead to exclusion of potential users resulting in loss of positive externalities provided by different activities.⁴⁴

Rather than relying on instruments based on property regimes and leaning on economic valuation of ecosystem services, the infrastructure theory proposes that in order to support the varied, heterogeneous uses of ecosystems, managing them as commons may be more desirable.⁴⁵ Frischmann argues that sustaining the fundamental structures in an open manner is critical to realizing the potential of positive externalities because doing so enables the public to participate productively in a wide range of socially valuable activities.⁴⁶

There are, however important differences between traditional and environmental infrastructure. One of the key differences is that human beings do not produce green infrastructure in a sense as other infrastructure recourses. Due to the partially non-rival nature and difficulties in producing new environmental resources, environmental infrastructure faces complex congestion and degradation problems in a different manner than other infrastructure recourses. The congestion and degradation problems lead to the conclusion that pure open access in absence of regulation is not feasible for environmental infrastructures.⁴⁷ Nevertheless, the management should, according to Frischmann, aim at enabling open access to the extent feasible. This can be done through regulating those ecosystem uses that drive rivalry.⁴⁸ How to manage the rivalry is

highly dependent on number of economic, social, and physical attributes as the rate and degree of rivalry varies across space and time. In this regard the nature of user groups, (current and future generations and non-humans) and the relevant resource characteristics such as the renewal rate of the resource affect the decision-making. Thus sustaining environmental infrastructure depends on institutions that allow consideration and accommodation of wide variety of interests and leave flexibility in local level implementation to take into account relevant resource characteristics and other attributes that affect the decision-making on how to best manage rivalry.⁴⁹

While providing some interesting insights for green infrastructure governance, the infrastructure theory fails, however, to consider some aspects that are relevant for managing environmental resources. For instance, it treats environmental infrastructure as separated assets, like lakes, forests and wetlands, and fails to address the issue of landscape scale management. Many of the ecosystem services are dependent on measures at broader landscape level. Thus, GI policy instruments should function across sectors and ecosystems and support landscape level management. In this regard, the coordination between different instruments is essential.

Further, depending on circumstances, management of green infrastructure requires different concrete measures: in some cases directing land use to specific areas or regulating activities to minimize the negative impacts on ecosystems are adequate, but in other cases conservation or restoration measures may be needed. In our opinion, any legal system supporting effectively green infrastructure should include legal mechanisms for all these functions.

Infrastructure theory also provides little information on the specific challenges for man-

⁴⁴ Id at p. 228.

⁴⁵ Id.

⁴⁶ Frischmann *supra* note 5 at p. 227.

⁴⁷ Id.

⁴⁸ Id at p. 235.

⁴⁹ Id at pp. 246–247.

aging environmental infrastructure due to its nature as complex socio-ecological system. Constant changes and uncertainties in socio-ecological systems make it difficult to manage GI. As changes are natural in ecosystems, it has become apparent that their protection and securing provisioning of ecosystem services cannot be achieved through eliminating changes. Instead, the focus of ecosystem management should be in enhancing and supporting ecosystem resilience.⁵⁰

Resilience is the capacity of a system to withstand internal and/or external change yet remain with the same regime.⁵¹ When resilience is exceeded, a system will reorganize around a different set of processes, producing different goods and services for humankind. Green infrastructure differs from traditional infrastructure especially in this regard. While man made infrastructures can be re-produced, repaired and restored, changing ecosystem back to the desired state may be difficult, or functionally impossible.⁵²

Conservation institutions that apply adaptive governance and adaptive management techniques have been viewed important for achieving ecosystem resilience.⁵³ Adaptive governance enhances an institution's capability to deal flexibly with new situations, thus preparing managers for uncertainty and surprise.⁵⁴ In order to enhance adaptive governance, environ-

mental laws need to be flexible enough to allow consideration of local conditions, experimenting and learning. However, while some scholars have delineated the benefits of a regulatory system with flexible norms, decentralized and redundant regulatory authority, also various weaknesses have been identified. These include the failure to address the broadly dispersed resource issues such as global climate change, and potential incentives for regulatory inattention as well as problems with legal security and enforceability.⁵⁵ As Buzbee explains, "especially where the causes of an ill cross jurisdictional borders, the harms themselves cross borders, and there is vertical or horizontal fragmentation of potential regulatory turfs, incentives for regulatory inattention are strong".⁵⁶ Thus, regulatory flexibility and fragmentation of decision-making needs to be balanced with adequate coordination of decision-making, robust monitoring and feedback systems.⁵⁷ To summarize the key findings of this section, we have identified the following criteria and questions relevant for the assessment of GI governance systems:

- **Coverage:** Does the current governance system include mechanisms which aim to serve the four functions (1) placement of activities affecting the environment; (2) protection of places of special importance; (3) regulation of activities and projects; and (4) restoration of habitats. Do these mechanisms cover all

⁵⁰ C. Hollings, Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics* 1973 4:1-24. C. Folke et al., Adaptive Governance of Social-Ecological Systems, 30 *Ann. Rev. Env't & Resources* 2005 at p. 441, 447.

⁵¹ Folke et al. *supra* note 46.

⁵² C. Folke et al., Regime Shifts, Resilience, and Biodiversity in Ecosystem Management, in L. Gunderson et al. (eds.) *Foundations of Ecological Resilience* 2009, at p.119, 142.

⁵³ See C. Arnold & L. Gunderson, L (2013) Adaptive Law and Resilience. *Environmental Law Reporter*, 2013 Vol. 43.

⁵⁴ *Ibid.*

⁵⁵ A. Camacho, Adapting governance to climate change: managing uncertainty through learning infrastructure. *Emory Law Journal* 2009 (59).

⁵⁶ W. Buzbee, The Regulatory Fragmentation Continuum, *Westway and the Challenges of Regional Growth*, J.L. & POL. 2005 (21) at p. 356.

⁵⁷ B. Cosens, Transboundary river governance in the face of uncertainty: resilience theory and the Columbia River Treaty. *Journal of Land Resources and Environmental Law* 2010 30(2). O. Green et al. *EU Water Governance: Striking the Right Balance between Regulatory Flexibility and Enforcement? Research, part of a Special Feature on Law and Social-Ecological Resilience, Part I*. 2011.

sectors and activities relevant for green infrastructure?

- **Capacity to enhance landscape level management and coordination of decision-making:** Does the governance system provide strategic planning framework to support individual decision-making processes?
- **Flexibility in local decision making and capacity to enhance multiple ecosystem uses:** Do the regulation allow taking into account local conditions in a relevant way? Do the laws include adequate mechanisms for accommodating diverging interest?
- **Robust monitoring and adaptation of decision making:** Does the governance system include adequate monitoring system and mechanisms to accommodate decision-making according the monitoring results and new information?

We have used these criteria to assess the feasibility of the Finnish governance system for the purposes of the green infrastructure policy. The focus of our assessment is on the legal and institutional frames relevant for the maintenance and improvement of green infrastructure. Hence, we do not aim to assess how legal and other mechanisms work, but only whether there is any legal and other institutional frames which could make possible to carry out long term green infrastructure policy. The basic rationale behind this is that public authorities may not make any decision affecting the rights and duties of private actors without legal basis and hence would this basis be lacking, there would not be green infrastructure policy.

There is no explicit green infrastructure policy in use in Finland. To focus our assessment on the right laws, we decided to explore laws which are relevant for functions we consider necessary to protect, sustain and (re)create green infrastructure: (1) placement of activities affect-

ing the environment; (2) protection of places of special importance; (3) regulation of activities and projects; and (4) restoration of habitats. In our opinion, any legal system supporting effectively green infrastructure should include legal mechanisms for all these functions. So we used this categorization for the identification of the relevant instruments, and thereafter we assessed this group of instruments using the above mentioned evaluation criteria.

The focus of our assessment directs also material gathering. The key source of information is the legal system itself: what kinds of legal mechanisms existing and what are their merits and flaws from the green infrastructure policy point of view. The public authorities need to base their work on law and hence their possibilities to make decisions are framed by law. Furthermore, an analysis of public policy documents informs us about the policy strategies and other non-legal means possible used for purposes relevant for green infrastructure policy. Hence, we have gone through a huge number of laws and public policy documents.

4. Results

This section presents the key results of our analysis. First we'll summarize our findings concerning which instruments we found relevant for green infrastructure policy. The detailed description of the instruments would require much of space and hence we are not able to do it in this paper.⁵⁸ After short description of the relevant instruments, our main observations will be described criterion by criterion.

⁵⁸ In a longer report – written in Finnish – the instruments have been described in detail. *J. Similä et al. Vihreä infra – ekosysteemipalveluiden ja luonnon monimuotoisuuden riippuvuus vihreästä infrastruktuurista ja sääntelyjärjestelmän muutostarpeet.* (Fortcoming in SYKE report series 2014).

The Finnish regulatory system directing placement of activities and regulating activities and projects relevant for green infrastructure consists of set of sector specific and few integrative instruments. Forestry, mining, land extraction and utilization of water resources are examples of sectors with specific direct regulation and administrative procedures (permits and notification systems). Agriculture is also regulated through the set of sector specific instruments, which are naturally largely affected by the Common Agricultural Policy (CAP). The key integrative instrument, which at least in principle, covers all sectors and activities, is planning law and its implementation mechanism (Land use and Building Act 132/1999). Planning law is mainly used for directing the placement of activities, but to some extent also to regulate the use of natural resources. Another key integrative instrument is the environmental impact assessment (Act on Environmental Impact Assessment Procedure 468/1994, Act on the Assessment of the Effects of Certain Plans and Programmes on the Environment 200/2005), which covers a wide range of activities, and does not exclude any projects or plans from the scope of assessment. The Environmental Protection Act (86/2000, currently under revision) with its direct regulations and permit procedure also covers all those activities that lead or may lead to environmental pollution. Its main function is to minimize and prevent environmental pollution through standard setting, but it also includes norms for directing the placement of activities within the project area. Also the Act on Water and Marine Resources Management 1299/2004 can be described as an integrative instrument based on principles of ecosystem management.

The key instruments for protection of places of special importance, including the Natura -2000 network and habitat's protection, can be found in Nature Conservation Act (1096/1996). In ad-

dition, the Water Act (587/2011), Act on Wilderness Areas (62/1991), Forest Act (1093/1996), and Rapids Conservation Act (35/1987) are used to protect certain habitat types in Finland. Some of the habitat types are directly protected through law, while others require separate administrative decision in order to have legal effects. In addition to these "traditional" nature conservation instruments, the voluntary protection of certain forest habitats is possible under the Forest Biodiversity Protection Programme for Southern Finland (METSO). Funding from this METSO programme is also used to incentivize restoration measures. In some cases the restoration measures are also obligated by the law. For instance, permits granted for utilization of natural resources often include obligations for landscaping or restoration measures after the project is finished. Also, if the degradation of ecosystem is due to illegal activities or activities that are against the permit granted, the obligation to conduct restoration measures can be placed according the Act on the Remediation of Certain Environmental Damages (383/2009).

In addition to these key legal instruments (and few others that were not described here due to the limited space), there are numerous soft law instruments such as National guidelines for land use, plans for biodiversity protection in agricultural lands, Recommendations for sustainable forestry, Water protection targets, and numerous plans and programmes for natural resources use that are of relevance and were included in the analysis. The key findings of our analysis are presented criterion by criterion below.

Coverage. We found that there is a rich web of instruments (regulatory, economic, and planning) in place, which are relevant for green infrastructure policy. The Finnish regulatory machinery provides opportunities, in principle, to conserve whatever habitats type authorities consider

worth of protecting and most of activities potentially changing the environment are regulated in some or another way. If we look at the four groups of instruments, the main institutional deficiency relates to **restoration**. In the Finnish legislation, there are only few explicit requirements for ecosystem restoration. However, as restoration measures are essential for reaching the targets of the EU's nature conservation and water protection legislation, ecological restoration is a commonly used, but largely unregulated nature conservation practice. The responsibility for ecosystem restoration in Finland is largely left to public bodies and is highly dependent on the availability of public finance. The Finnish law does not allow the setting of obligations on landowners to take active measures to restore habitats except when this obligation is a permit condition of natural resources use. There are only few legal obligations, which require restoration of changed habitats (e.g. after extraction of soil or mineral resources), but their scope is limited and they do not necessarily cover all old activities. There is no general mechanism able to cover situations where the need to restore habits is based on the cumulative effects of various kinds of possible small activities. Thus the restoration measures are focused on publicly owned protected areas. Outside those areas, restoration in requires either voluntary action based on negotiation or economic instruments compensating the economic loss that activities done for the public good may cause. The key instrument to finance biodiversity conservation measures in Finland is the METSO programme. However, it covers only forest areas and provides limited possibilities to fund restoration projects. With regard to the **placement of activities and regulation of them**, the regulatory web seems to cover all major activities and hence provide some kinds of tools for direction of detrimental activities from places which is important for green infrastruc-

ture. However, some small activities, like falling outside the permitting procedure, such as pulling cords can be carried out without any environmental control. The control of extraction of peat covers pollution effects, but do not cover negative effects on nature conservation values. The Nature Conservation and the Forest Act, as well as Water Act and Rapids conservation Act include tools to **protect some places of special importance**, although these mechanisms have been criticized for covering too small areas and only a part of habitats in need of protection.⁵⁹

Capacity to enhance landscape level management and coordination of decision-making. The main and almost only mechanism for landscape level management is planning instruments, at regional and local levels. The planning law, however, is not sufficient to ensure that the ecosystem services of green infrastructure are maintained. The planning law has quite powerful means for drawing the main lines for **the placement of various activities**, although the final location may be different from the one indicated in the plan. In addition, the detailed regulation – and defining the crucial permit conditions – is done under other laws, which do not always require that planning decisions are taken into account. Planning law has dual role for **the protection of places of special importance**. The role of planning is mainly informative with regard to those places already strictly protected under the Nature Conservation Act, Forests Act, Water Act and Rapids Conservation Act. The implementation of these laws is a responsibility of state authorities, whereas local government has the responsibility for planning. Strict protection under

⁵⁹ J. Similä, et al. Luonnonsuojelulainsäädännön arviointi – Lain toimivuus ja kehittämistarpeet. Suomen Ympäristö 27/2010. A. Raunio, et al. Luontotyypisuojelun nykytilanne ja kehittämistarpeet – lakisääteiset turvaamiskeinot. Suomen ympäristö 5/2013.

the planning law is possible, but limited spatially and temporary. The instruments available under the planning law are, however, used to complement the strict protection by, for example, creating buffer zones, where some sort of land uses are restricted or to enhance connectivity between protected areas. The **restoration of habitats** is excluded from the scope of the planning law. With regard to other laws, none of them provide effective tools for landscape management and coordination. There are some rules concerning the order in which permits should be granted and rules aiming to ensure that decisions are not overlapping. However, while these rules are important as such, they do not provide mechanisms which aim to landscape level management and coordination. In practice, landscape level planning is utilized in state owned land and water areas. The planning methods used by Metsähallitus (The Finnish Forest Park Service), which is responsible the administration and management of more than 12 million hectares of state owned land and water areas, is based on a a multi-stage planning system covering regional decisions on natural resources management, nature conservation and other forms of land use as well as detailed local plans for a particular operations. The decisions made in regional level on land use are implemented by means of detailed operational planning. Operational planning includes amongst others, silviculture and felling plans, forest and mire restoration and route plans.⁶⁰

Robust monitoring and adaptation of decision-making. It is not surprising to find that monitoring and feedback mechanisms are built to support sectoral decision-making, not the changes of overall green infrastructure. In particular, there is no sufficient data concerning ecosystem

services and mechanism affecting the provision of those services. After saying this, it need to be stressed that there is a huge number monitoring programmes and data banks, which are in some way or another relevant for the understanding of the state and changes of green infrastructure. For example, biodiversity monitoring programmes provide relevant information, although green infrastructure policies call for new kinds of information. Nevertheless, a new combination of existing sources of information provide opportunities to develop the information basis for green infrastructure policy as show by our colleagues, who have buildt up maps on ecosystem services based on a method what they called green frame⁶¹ using existing data.

What comes to the mechanisms to respond to the new knowledge gained through monitoring or other vice, we concluded that there are various approaches in use aiming to increase adaptive capacity of the governance-system relevant for green infrastructure. To begin with, in a small country like Finland, even environmental laws are revised often, two thirds of environmental laws and regulation is less than 10 years old and one third less than 5 years old.⁶² Regulatory impact assessment is obligatory for all new laws and either strategic impacts assessment or environmental impact assessment for all major policy and administrative decisions. Undoubtedly, this system includes a number of elements which increase adaptive capacity of public decision-making.

With regard to the **placement of activities** the plans under the planning laws are frequently

⁶⁰ <http://www.metsa.fi/sivustot/metsa/en/NaturalResources/Sivut/NaturalResources.aspx>

⁶¹ L. Kopperoinen, *et al.* Using expert knowledge in combining green infrastructure and ecosystem services in land use planning: an insight into a new place-based methodology, *Landscape Ecology* 2014 (DOI 10.1007/s10980-014-0014-2).

⁶² J. Similä, *Regulating Industrial Pollution – The Case of Finland.* Forum Iuris 2007.

updated. Further, permit decisions **regulating activities** need to be renewed after a period of time, and conditions for subsidies are regularly revised. Modern laws governing the regulation of activities and projects, make even it possible to open a process aiming to change permit conditions before the regular revision, if something unforeseeable happen. Having said this, one exception, relevant for green infrastructure was identified among the regulations on permit procedures. According the Water Act (2011/587) section 14 the party responsible for the project shall be obliged to take measures to prevent or reduce the damage to fish stocks or fishing, (fisheries obligation) or be ordered to pay a fee to the fisheries authorities. The regulations on fisheries obligations may be amended by the permit authority if the conditions have fundamentally changed. The problem, however, is that there are old water permits granted for hydro power plants without such an obligation at the first place. As stated in the Finnish Supreme Court decision 27.3.2006/676, despite the changed conditions, the fisheries obligation cannot be placed once the permit is revised, if there was no such an obligation in original permit. This has been proven to be problematic in terms of **restoring** the migratory fish stocks, which have significantly decreased due to hydro power plants.⁶³

Further, the problem lies on the fact that the adaptive capacity of regulation is not harnessed for the maintenance and improvement of green infrastructure. The legal requirements for renewal of permits or changing them before regular revision do not make any special reference to landscape level changes and need to coordinate activities with other ones. **The same applies to the protection of places of special importance;**

they do not improve the capacity of governance system to react to changes beyond the narrow focus of the regulation.

Flexibility in local implementation and accommodation of diverging interests. The benefit of planning law from the perspective of green infrastructure policy is that it offers flexible and democratic means to accommodate diverging interests through **placement of activities**. The planning law requires consideration of economic, ecological and social interests in land use plans. Compared to the planning law, the **regulation of activities** through sector specific regulation and permit procedures leave less room for flexibility in local level implementation and accommodating diverging interest in decision-making. This is because often, according the law or its interpretation permits are to be granted if the certain pre-conditions set by the law are met. In this regard, the permit procedure under the Water Act differs from other permitting systems as it is based on a principle of interest weighing, seemingly allowing all kinds of interests to be taken into consideration. Having said this, in practice the difference between these two systems has been less significant.⁶⁴

In terms of **protecting places of special importance**, the legal mechanism protecting certain habitat's directly by law, such as habitats for species considered in a need for strict protection under the Habitat's Directive, can be regarded as too static, inflexible, and incapable of accommodating diverging interest and taking into account local conditions. Thus, protecting areas through separate administrative decision-making procedure and drawing management plans for protected areas provides, at least in principle, more

⁶³ Government Decision in Principle 8.3.2012. National strategy on Fish Paths.

⁶⁴ A Ekroos & M. Warsta, Luontoarvot ympäristölupamenetelyssä. Selvitys ympäristönsuojelulain ja muun lain-säädännön kehittämismahdollisuuksista. 2012.

flexible means to accommodate diverging interests. However, at least what comes to the areas included in Natura 2000 -network, the flexibility in local implementation seems to be hindered by the use of rather static ecology criteria (conservation objectives) under the Habitat's Directive, easily opposing natural interests to social and economic interests. The assessment of the projects and plans according the article 6 of the Habitat's Directive, starts with the crucial question whether a plan or project has significant effects on the Natura 2000-site's conservation objectives. This assessment based on strictly ecological criteria might easily lead to a blocking away of socio-economic interests.⁶⁵

In addition, the strict application of the provisions for the habitat's and species protection may even paradoxically unincite **restoration** measures. As pointed out by Schoukens, strict application of the Habitat's directive may, for instance, take away chances for the establishment of "temporary nature" on those lands that lay vacant waiting for the future developments. The landowner is rather incentivized to prevent protected species and habitat's to settle in order to avoid strict land use restrictions in the future.⁶⁶

5. Discussion and conclusion

In this paper we have developed an approach for the assessment of current governance system to understand to what extent it could serve the purposes of green infrastructure policy and how current governance system could be developed. By governance system we mean legal and other

institutional arrangements in which the implementation of green infrastructure policy will take place. Our main focus is on legal system, although we are not limiting ourselves solely to the legal sphere.

We found that Brett Frischmann's infrastructure theory gives a sound starting point for the building of assessment framework. Originally Frischmann has developed his theory for other than environmental field and his theory, as interesting it is, fails to take into account all nuances of environmental resources. Particularly it fails to consider the landscape level management needed to secure the provisioning of certain ecosystem services, such as pollination, and the special nature of green infrastructure as a complex socio-economic system in a need of adaptive management.

We applied the framework in the governance system of green infrastructure resources in Finland and found it useful. Based on our analysis the greatest weakness of the current governance system in Finland for green infrastructure is the lack of mechanisms for landscape level management and weak coordination between instruments. The current governance system for green infrastructure in Finland consists of broad, but fragmented set of instruments. While regulatory fragmentation as such cannot be regarded as negative phenomena it becomes problematic, if the coordination between instruments and information sharing between authorities is not adequate. The sector specific governance systems and single decision-making procedures often restrict the consideration only to the particular activity and the area in question. They fail to provide means to plan conservation of wider landscapes and to consider joint effects. Further, as Camacho explains the regulatory fragmentation runs the risk of regulatory inattention.⁶⁷

⁶⁵ See more in *S. Borgström & F. Kistenkas*, Green Infrastructure and Ecosystem services: re-assessment of the Habitat's Directive (EELR 23/2014).

⁶⁶ *H. Schoukens* 'Temporary Nature: A new way forward for ecological restoration in highly urbanized areas?' The Nordic Environmental Social Science Conference, 11-13 June 2013 Abstracts. available in http://ness2013.ku.dk/documents/NESS_2013-Volume_of_abstracts.pdf/

⁶⁷ *Camacho supra* note 53.

The main and almost only mechanism for landscape level management in Finland is planning instruments governed by the planning law, at regional and local levels. The planning law provides soft means to support landscape level management and coordination between instruments, but these means are insufficient. Although these instruments are used in the planning practice, their influence on the actual land uses is limited partly because of the legal nature of the instruments and partly because unsatisfactory coordination between policies of local governments and state authorities. Further, the link between instruments regulating various activities and planning law is either fully lacking or weak.

There are several options to find ways forward towards more integrative, coordinated governance system for green infrastructure. The situation could be improved also without changes in legislation. This could be done through educating planners and making use of new methods developed to provide spatial information on ecosystem services. In addition, strengthening the cooperation and information sharing between authorities would be beneficial. The weakness of this approach, however, is that without changes in legislation the link between instruments regulating various activities and planning law would continue to be blurred. In addition, spatial planning cannot be used to obligate or incentives ac-

tive management measures, such as restoration, which is one of the core objectives of EU's green infrastructure policy.⁶⁸ As the current governance system does not include instruments to provide a sound basis for restoration of various habitats types, new instruments or changes in current once are likely needed, if the restoration target of 15 % of degraded ecosystems by 2020 is to be reached.

Thus, we propose, that Finland would follow the example of other countries, which have already adopted or plan to adopt a new special planning mechanism for green infrastructure. What is common to those new mechanisms is that they aim to provide means to conceive the big picture spatially, to provide common understanding of the measures needed across-sectors at national and regional level, and to enhance coordination and cooperation between different actors.

Green infrastructure policy is needed as a response to the continuous loss of biodiversity and degradation of ecosystems and ecosystem services. The current environmental and other sectoral policies and legislation to support them are inadequate, as they fail to integrate the consideration of services that nature provides us for free into all decision-making that affects the use of land and water resources. Thus, changes in current governance systems are needed to provide sound basis for green infrastructure policy.

⁶⁸ *European Commission supra* note 3.