



<http://www.diva-portal.org>

This is the published version of a paper published in *Landscape and Urban Planning*.

Citation for the original published paper (version of record):

Albert, C., Fürst, C., Ring, I., Sandström, C. (2020)

Research note: Spatial planning in Europe and Central Asia - Enhancing the consideration of biodiversity and ecosystem services

Landscape and Urban Planning, 196: 103741

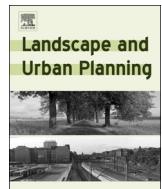
<https://doi.org/10.1016/j.landurbplan.2019.103741>

Access to the published version may require subscription.

N.B. When citing this work, cite the original published paper.

Permanent link to this version:

<http://urn.kb.se/resolve?urn=urn:nbn:se:umu:diva-168904>



Research note: Spatial planning in Europe and Central Asia – Enhancing the consideration of biodiversity and ecosystem services

Christian Albert^{a,*}, Christine Fürst^b, Irene Ring^c, Camilla Sandström^d

^a Ruhr University Bochum, Institute of Geography, Universitätsstr. 150, 44805 Bochum, Germany

^b Martin Luther University Halle-Wittenberg, Institute for Geosciences and Geography, Von-Seckendorff-Platz 4, 06120 Halle, Germany

^c Technische Universität Dresden, International Institute Zittau, Markt 23, 02763 Zittau, Germany

^d Umeå University, Department of Political Science, Umeå University, SE-901 87 Umed, Sweden



ARTICLE INFO

Keywords:

Spatial planning
Governance
Multi-scale decision making
Decision support
Spatial analysis and modelling
IPBES

ABSTRACT

This research note explores opportunities for spatial planning to enhance the consideration of biodiversity and ecosystem services (ES) in Europe and Central Asia. We refer to and build on the regional assessment of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). We find that a targeted and integrated approach to spatial planning can substantially enhance the conservation and sustainable use of biodiversity and ES. Spatial planning is a key instrument to explore spatial implications of combined policies on biodiversity and ES, and to design synergistic solution strategies. Together with other legal and regulatory instruments, spatial planning represents the backbone of policy mixes for biodiversity and ES delivery. Promising strategies for enhancing biodiversity and ES implementation in spatial planning include (i) mapping spatially explicit biodiversity and ES information in appropriate resolution, (ii) developing methods and tools for integrating this information in planning practice, and (iii) fostering delivery mechanisms.

1. Introduction

A recent regional assessment of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) found that biodiversity and Ecosystem Services (ES, included in the broadened concept of Nature's Contributions to People in the IPBES context, see Diaz et al., 2018) have continued to decline in Europe and Central Asia (IPBES, 2018). In response, the assessment proposes several governance options to halt the loss of biodiversity and to safeguard and sustainably use ES (Ring et al., 2018). Four categories of policy instruments are distinguished, including legal and regulatory instruments, economic and financial instruments, social and information-based instruments, and rights-based instruments and customary norms. Based on the IPBES regional assessment report, the aim of this contribution is to explore opportunities for spatial planning to enhance the consideration of biodiversity and ES in Europe and Central Asia in the different hierarchies of planning with reference to the above-mentioned policy instruments.

Spatial planning can be understood as a key for establishing sustainable frameworks for social, territorial and economic development (UNECE, 2008: VII). Spatial planning is both a regulatory and information-based instrument and can be complemented by economic,

financial and rights-based instruments. Spatial planning provides guidance for potential policy implementation in terms of land use priorities, and thereby helps steering future development opportunities. However, the extent to which policies and plans are implemented depends upon their level of legal binding force and the political will of governments. The European Spatial Development Perspective (European Commission, 1999) frames spatial planning and is complemented by the Territorial Agenda of EU. Informal instruments such as the Charter of European Planning by the European Council of Spatial Planners (ECTP-CEU, 2013) define challenges and good practices in spatial planning, building, for example, on the need to recognize social, environmental and economic connectivity and to consider the precautionary principle and the environment in all decision-making processes.

Western Europe has developed distinct types of planning systems (Nadin & Stead, 2008) which differ with respect to the planning traditions and legal binding (Commission of the European Communities, 1997) and specific approaches of how, at which scale, and with which spatial detail plans are broken down from European and national policies (Oliveira & Hersperger, 2018). Countries in Eastern Europe and Central Asia have historically been characterized by socialist spatial planning with very limited or no public participation, focussing on compact urban development with large areas for parks and public

* Corresponding author.

E-mail address: christian.albert@rub.de (C. Albert).

spaces (Hirt, 2013). After the collapse of the Union of Soviet Socialist Republics (USSR), more diverse development patterns emerged. Although public participation remains limited, the last decades have seen trends towards more participatory governance and planning as well as calls for capacity building in landscape and spatial planning (Petřík, Fanta, & Petřtík, 2015). This, however, is more applicable for the Western-oriented European countries.

2. Benefits of targeted spatial planning

The conservation of biodiversity and the sustained provision of ES are strongly dependent on spatial considerations. For example, connectivity, fragmentation, as well as landscape composition and configuration can have strong effects on the biodiversity and ecosystem functions that underlie the provision of ES (Dobbs, Kendal, & Nitschke, 2014; Fischer & Lindenmayer, 2007; Lamy, Liss, Gonzalez, & Bennett, 2016; Martin et al., 2019; Mitchell et al., 2015). Several links exist between the spatial distribution of components of biodiversity and the delivery of ES (Cardinale et al., 2012; Mace, Norris, & Fitter, 2012). Furthermore, the spatial configuration of landscapes, and the spatial relationships of ES demand and supply areas play important roles (Fisher, Turner, & Morling, 2009; Syrbe & Walz, 2012). Spatial planning that incorporates this knowledge and these dynamics could be strongly effective in supporting biodiversity and ES protection (Chan, Shaw, Cameron, Underwood, & Daily, 2006; Jones et al., 2013).

Spatial planning can positively and negatively influence the conservation and sustainable use of biodiversity and ES (von Haaren, Albert, & Galler, 2016). If spatial planning takes into account best available knowledge on the spatial distribution of biodiversity and ES provision and considers those carefully in the design of preferred plans, landscape ecological knowledge may come to bear in spatial planning and decision making (Opdam et al., 2013) and benefits for people and nature can be generated (Arkema et al., 2015). However, if spatial planning disregards the consideration of nature, for example, when infrastructure development is proposed in current hotspots of biodiversity or ES delivery, spatial planning may pose negative impacts on biodiversity and ES such as fragmentation or soil sealing (Scolozzi, Morri, & Santolini, 2012). Furthermore, spatial planning is sometimes criticized for its needs of data, experts, and resources, and is often regarded as an instrument inhibiting business development rather than facilitating action (Allmendinger & Haughton, 2009). However, several arguments in favor of spatial planning exist:

Spatial planning can serve as a keystone instrument to consider spatial implications of combined policies by working reactively to minimize or compensate for impacts and trade-offs of policy options for ensuring informed decisions on biodiversity and ES (Grêt-Regamey, Celio, Klein, & Wissen Hayek, 2013; Rozas-Vásquez, Fürst, Geneletti, & Almendra, 2018). Through tools such as simulation modelling and scenario studies (e.g. Englund, Berndes, & Cederberg, 2017; Guerry et al., 2012), spatial planning helps identifying trade-offs between policy objectives for biodiversity conservation and ES provision on the one hand and conflicting objectives and actions of economic and further policy sectors on the other (Geneletti, 2011; Helming, Diehl, Geneletti, & Wiggering, 2013). It can provide the information basis to recognize potential impacts of development proposals. Spatial planning works in concert with instruments such as Strategic Environmental Assessments (SEAs) of plans and programs or Environmental Impact Assessments (EIAs) at the project level to avoid negative impacts and eventually propose mitigation measures to compensate for those impacts deemed ultimately necessary (Partidario & Gomes, 2013). Informed planning can furthermore enhance the engagement and experience of nature among citizens, facilitate public participation, enhance environmental behavior and stewardship (Beatley, 2011), in particular if the ES concept is applied in planning as a boundary object to which diverse stakeholders can relate to (Opdam, Albert, Fürst, Grêt-Regamey, Kleemann, Parker, La Rosa, Schmidt, Villamor Grace, & Walz, 2015;

Spyra et al., 2019). Furthermore, spatial planning can provide the basis for targeted investments in biodiversity and ES, for example by designating specific areas for results-oriented agri-environmental measures (Galler, von Haaren, & Albert, 2015; Sverdrup-Thygeson, Søgaard, Rusch, & Barton, 2014).

A targeted approach to spatial planning that aims at optimizing the delivery of both market and non-market goods and services (Batemann et al., 2013) and integrates across disciplines, sectors and scales can substantially enhance the conservation and sustainable use of biodiversity and ES, and enhance people's quality of life (Albert et al., 2016; Guerry et al., 2015; Kaczorowska, Kain, Kronenberg, & Haase, 2016). As such, targeted spatial planning has proved useful to enhance the consideration of ES in practice, for example by providing stakeholders with opportunities to address complex marine social-ecological systems in Latvia (Veide mane et al., 2017), by facilitating the co-design of a preferred spatial plan for the development of Belize's coastal zone (Arkema et al., 2015), or by supporting a cooperative process to designate a protected area to halt high-Andean wetland degradation in Argentina (Rubio, Rubio, Salomón, & Abraham, 2017). In particular, such targeted spatial planning processes are most likely to successfully influence decision-making as part of an iterative science-policy process, applying relatively simple but robust models and multidimensional valuation, training local experts, and appropriately communicating uncertainties (Ruckelshaus et al., 2015). Spatial planning can thus proactively propose strategies that safeguard sensitive areas, enhance the state of ecosystems, and identify synergistic land-use options (Kopperoinen, Itkonen, & Niemelä, 2014). In its capacity to consider systemic properties, spatial planning is a unique instrument to integrate and balance diverse interests and policies in suggesting spatial strategies of how a future city, landscape or region should be developed (Grêt-Regamey, Altweig, Sirén, van Strien, & Weibel, 2017). Urban planning, as a subfield of spatial planning, has particular potentials to ensure biodiversity protection and ES delivery to enhance the quality of life of an increasing number of urban dwellers (Gómez-Baggethun & Barton, 2013; Niemelä et al., 2010).

Regardless if re-active or pro-active perspectives are adopted, legal and regulatory instruments such as spatial planning serve as a backbone of policy mixes that can facilitate effective resource allocation for the protection and enhancement of biodiversity and ES (Schröter-Schlaack & Blumentrath, 2011; Hansjürgens et al., 2011). Spatial planning can thereby help identifying areas in particular need for targeted investment of public spending in agri-environmental measures, or to specify management requirements, in order to safeguard species or to ensure ES delivery (Galler et al., 2015; Sverdrup-Thygeson et al., 2014; Uthes, Matzdorf, Müller, & Kaechele, 2010). Spatial planning can also be understood as a policy mix in itself, due to combining instruments with different binding force and being applied across governmental levels and sectors complementing each other (Schröter-Schlaack & Blumentrath, 2011).

3. Challenges and knowledge gaps

Important challenges remain for an enhanced consideration of biodiversity and ES in spatial planning in Europe and Central Asia. Despite a growing number of methods for assessing and valuing biodiversity and ES, oftentimes spatial information on biodiversity and ES in appropriate resolution for decisions, and tools applicable in the often time- and resource-constrained context of planning practice are still rare (Bagstad, Semmens, Waage, & Winthrop, 2013). Scale issues need to be taken into consideration, with ES maps provided for one level providing inadequate information for decision making at other levels (Albert, Von Haaren, Othengrafen, Krätzig, & Saathoff, 2017; Hein, van Koppen, de Groot, & van Ierland, 2006).

Furthermore, methods and tools need to be further developed to integrate information on biodiversity and ES in planning practice instruments. Options exist for better integrating biodiversity and ES in

diverse spatial planning instruments, for example in landscape planning (Albert et al., 2016), urban planning and economic valuation (Gómez-Baggethun & Barton, 2013), or forestry planning (Fürst, Frank, Witt, Koschke, & Makeschin, 2013). An effective uptake of considerations of biodiversity and ES is often hampered by the sectoral nature of policies and distributed responsibilities in many planning systems that lead to fragmented strategies (von Haaren & Reich, 2006). A multi-sectorial and multi-scale approach (considering several sectors and levels of decision-making; cf. Connolly, Svendsen, Fisher, & Campbell, 2014; Ernstson, Barthel, Andersson, & Borgström, 2010) needs to be applied, and trade-offs between biodiversity and ES, and between different ES to be accounted for (Gonzalez-Redin, Luque, Poggio, Smith, & Gimona, 2016), to ensure that public interests and the benefits provided by ecosystems are considered in decision-making (TEEB, 2011). For example, mainstreaming biodiversity and ES in Strategic Environmental Assessments (SEAs) could ensure their consideration in policies, plans and programs (Geneletti, 2011).

A knowledge-to-action gap exists for spatial strategies for safeguarding and enhancing biodiversity and ES to become implemented (Albert, Aronson, Fürst, & Opdam, 2014; Daily et al., 2009; Lautenbach et al., 2019). Delivery mechanisms for proposed actions need to be fostered that consider planning proposals as part of systematic governance and policy mixes. This is especially important since disconnected actors often administer planning and implementation (Albert et al., 2017; Mörtberg, Balfors, & Knol, 2007; von Haaren & Albert, 2011; Yigitcanlar & Teriman, 2015). The uptake of environmental considerations is complicated by limitations in political support and financial resources, spatial misfits between planning constituencies and ecosystems (Trepel, 2010).

A further challenge is the scarcity of comparative studies of spatial planning throughout Europe and Central Asia (notable exceptions including Albrechts, Healey, & Kunzmann, 2003; Nadin & Stead, 2008), for example, how planning affects biodiversity and ES in different governance contexts, how information on ES affects planning practice, and how implementing planning propositions can be improved. Challenges include the limited access to (English language) planning documents in Eastern Europe and Central Asia, and stark differences between planning practice and planning as described in the legislation. Further knowledge is needed on how information could best be communicated in planning processes (de Groot, Alkemade, Braat, Hein, & Willemen, 2010).

4. Conclusion

Three insights and recommendations emerge that may be applicable also to regions beyond Europe and Central Asia: First, spatial planning may serve as a keystone instrument to explore the spatial implications of combined policies, for example regarding areas of conflicts between economic and policy sectors, and impacts on biodiversity and ES (Geneletti, 2011; Helming et al., 2013; Rozas-Vásquez et al., 2018). By harnessing information from simulation models and scenario building, spatial planning can propose targeted strategies to avoid pervasive outcomes and to exploit synergies.

Second, spatial planning, together with other legal and regulatory instruments, represents the backbone of policy mixes required to ensure effective allocation of resources for safeguarding, restoring and enhancing biodiversity and ES. Spatial planning informed by biodiversity and ES can facilitate public participation and stewardship and provide the basis for targeted investments into ES, for instance by designating areas for results-oriented agri-environmental measures (Galler et al., 2015). Hence, spatial planning can also be understood as a policy mix in itself (Schröter-Schlaack & Blumentrath, 2011).

Third, promising strategies for enhancing the implementation of biodiversity and ES in spatial planning with connections to rural, regional and sectorial funding strategies are threefold: (i) mapping spatially explicit information on biodiversity and ES in appropriate

resolution for decisions at respective scales, (ii) developing methods and tools for integrating information on biodiversity and ES in planning practice, and (iii) fostering delivery mechanisms that consider planning proposals as part of systematic governance and policy mixes. We recommend building alliances between planners, administrative, public, business and civil actors to mainstream biodiversity and ES in all relevant policy and decision processes towards more sustainable spatial development for people and nature.

CRediT authorship contribution statement

Christian Albert: Conceptualization, Methodology, Investigation, Writing - original draft, Writing - review & editing. **Christine Fürst:** Conceptualization, Investigation, Writing - review & editing. **Irene Ring:** Conceptualization, Writing - review & editing. **Camilla Sandström:** Conceptualization, Writing - review & editing.

Acknowledgement

C.A. acknowledges funding from the German Ministry for Education and Research (BMBF) for the PlanSmart research group (code: 01UU1601A). We thank Raphael Weber for his assistance in performing the original literature review.

References

- Albert, C., Aronson, J., Fürst, C., & Opdam, P. (2014). Integrating ecosystem services in landscape planning: Requirements, approaches, and impacts. *Landscape Ecology*, 29(8), 1277–1285.
- Albert, C., Galler, C., Hermes, J., Neuendorf, F., von Haaren, C., & Lovett, A. (2016). Applying ecosystem services indicators in landscape planning and management: The ES-in-Planning framework. *Ecological Indicators*, 61, 100–113.
- Albert, C., Schröter-Schlaack, C., Hansjürgens, B., Dehnhardt, A., Döring, R., Job, H., ... von Haaren, C. (2017). An economic perspective on land use decisions in agricultural landscapes: Insights from the TEEB Germany study. *Ecosystem Services*, 25, 69–78.
- Albert, C., Von Haaren, C., Othengrafen, F., Krätzig, S., & Saathoff, W. (2017). Scaling policy conflicts in ecosystem services governance: A framework for spatial analysis. *Journal of Environmental Policy and Planning*, 19(5), 574–592.
- Albrechts, L., Healey, P., & Kunzmann, K. R. (2003). Strategic spatial planning and regional governance in Europe. *Journal of the American Planning Association*, 69(2), 113–129.
- Allmendinger, P., & Haughton, G. (2009). Critical reflections on spatial planning. *Environment and Planning A*, 41(11), 2544–2549.
- Arkema, K. K., Verutes, G. M., Wood, S. A., Clarke-Samuels, C., Rosado, S., Canto, M., ... Guerry, A. D. (2015). Embedding ecosystem services in coastal planning leads to better outcomes for people and nature. *Proceedings of the National Academy of Sciences*, 112(24), 7390.
- Bagstad, K. J., Semmens, D. J., Waage, S., & Winthrop, R. (2013). A comparative assessment of decision-support tools for ecosystem services quantification and valuation. *Ecosystem Services*, 5, 27–39.
- Bateman, I. J., Harwood, A. R., Mace, G. M., Watson, R. T., Abson, D. J., Andrews, B., ... Termansen, M. (2013). Bringing ecosystem services into economic decision-making: Land use in the United Kingdom. *Science*, 341(6141), 45–50.
- Beatley, T. (2011). *Biophilic cities integrating nature into urban design and planning*. Washington, Covelo, London: Island Press.
- Cardinale, B. J., Duffy, J. E., Gonzalez, A., Hooper, D. U., Perrings, C., Venail, P., ... Naeem, S. (2012). Biodiversity loss and its impact on humanity. *Nature*, 486(7401), 59–67.
- Chan, K. M. A., Shaw, M. R., Cameron, D. R., Underwood, E. C., & Daily, G. C. (2006). Conservation planning for ecosystem services. *PLoS Biology*, 4(11), e379.
- Commission of the European Communities (1997). *The EU Compendium of Spatial Planning Systems and Policies*. Luxembourg: Commission of the European Communities.
- Connolly, J. J. T., Svendsen, E. S., Fisher, D. R., & Campbell, L. K. (2014). Networked governance and the management of ecosystem services: The case of urban environmental stewardship in New York City. *Ecosystem Services*, 10, 187–194.
- Daily, G. C., Polasky, S., Goldstein, J., Kareiva, P. M., Mooney, H. A., Pejchar, L., ... Shallenberger, R. (2009). Ecosystem services in decision making: Time to deliver. *Frontiers in Ecology and the Environment*, 7(1), 21–28.
- de Groot, Alkemade, R., Braat, L., Hein, L., & Willemen, L. (2010). Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making. *Ecological Complexity*, 7(3), 260–272.
- Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R. T., Molnár, Z., ... Shirayama, Y. (2018). Assessing nature's contributions to people. *Science*, 359(6373), 270.
- Dobbs, C., Kendal, D., & Nitschke, C. R. (2014). Multiple ecosystem services and dis-services of the urban forest establishing their connections with landscape structure and sociodemographics. *Ecological Indicators*, 43, 44–55.
- ECTP-CEU. (2013). The Charter of European Planning. Approved by the General assembly

- of Barcelona 22 April 2013. Available at: <http://www.ecpt-ceu.eu/images/stories/PDF-docs/The%20Charter%20of%20European%20Planning-HighResV2.pdf> (accessed 6 January 2020).
- Englund, O., Berndes, G., & Cederberg, C. (2017). How to analyse ecosystem services in landscapes—A systematic review. *Ecological Indicators*, 73, 492–504.
- Ernstson, H., Barthel, S., Andersson, E., & Borgström, S. T. (2010). Scale-crossing brokers and network governance of urban ecosystem services: The case of Stockholm. *Ecology and Society*, 15(4), 28.
- European Commission. (1999). European Spatial Development Perspective Towards Balanced and Sustainable Development of the Territory of the European Union. Available at: https://ec.europa.eu/regional_policy/sources/docoffic/official/reports/pdf/sum_en.pdf (accessed 6 January 2020).
- Fischer, J., & Lindenmayer, D. B. (2007). Landscape modification and habitat fragmentation: A synthesis. *Global Ecology and Biogeography*, 16(3), 265–280.
- Fisher, B., Turner, R. K., & Morling, P. (2009). Defining and classifying ecosystem services for decision making. *Ecological Economics*, 68(3), 643–653.
- Fürst, C., Frank, S., Witt, A., Koschke, L., & Makeschin, F. (2013). Assessment of the effects of forest land use strategies on the provision of ecosystem services at regional scale. *Journal of Environmental Management*, 127, S96–S116.
- Galler, C., von Haaren, C., & Albert, C. (2015). Optimizing environmental measures for landscape multifunctionality: Effectiveness, efficiency and recommendations for agri-environmental programs. *Journal of Environmental Management*, 151, 243–257.
- Geneletti, D. (2011). Reasons and options for integrating ecosystem services in strategic environmental assessment of spatial planning. *International Journal of Biodiversity Science, Ecosystem Services & Management*, 7(3), 143–149.
- Gómez-Baggethun, E., & Barton, D. N. (2013). Classifying and valuing ecosystem services for urban planning. *Ecological Economics*, 86, 235–245.
- Gonzalez-Redin, J., Luque, S., Poggio, L., Smith, R., & Gimona, A. (2016). Spatial Bayesian belief networks as a planning decision tool for mapping ecosystem services trade-offs on forested landscapes. *Environmental Research*, 144, 15–26.
- Grêt-Regamey, A., Altweig, J., Sirén, E. A., van Strien, M. J., & Weibel, B. (2017). Integrating ecosystem services into spatial planning—A spatial decision support tool. *Landscape and Urban Planning*, 165, 206–219.
- Grêt-Regamey, A., Celio, E., Klein, T. M., & Wissen Hayek, U. (2013). Understanding ecosystem services trade-offs with interactive procedural modeling for sustainable urban planning. *Landscape and Urban Planning*, 109(1), 107–116.
- Guerry, A. D., Polasky, S., Lubchenco, J., Chaplin-Kramer, R., Daily, G. C., Griffin, R., ... Vira, B. (2015). Natural capital and ecosystem services informing decisions: From promise to practice. *Proceedings of the National Academy of Sciences*, 112(24), 7348.
- Guerry, A. D., Ruckelshaus, M. H., Arkema, K. K., Bernhardt, J. R., Guannel, G., Kim, C.-K., ... Spencer, J. (2012). Modeling benefits from nature: Using ecosystem services to inform coastal and marine spatial planning. *International Journal of Biodiversity Science, Ecosystem Services & Management*, 8(1–2), 107–121.
- Hansjürgens, B., Schröter-Schlaack, C., Tucker, G., Vakrou, A., Bassi, S., ten Brink, P., Ozdemiroglu, E., Shine, C., Wittmer, H., 2011, Addressing losses through regulation and pricing, in: The economics of ecosystems and biodiversity (TEEB) in national and international policy making (P. ten Brink, ed.), Earthscan, London, UK, pp. 299–343.
- Hein, L., van Koppen, K., de Groot, R. S., & van der Linde, E. C. (2006). Spatial scales, stakeholders and the valuation of ecosystem services. *Ecological Economics*, 57(2), 209–228.
- Helming, K., Diehl, K., Geneletti, D., & Wiggering, H. (2013). Mainstreaming ecosystem services in European policy impact assessment. *Environmental Impact Assessment Review*, 40, 82–87.
- Hirt, S. (2013). Whatever happened to the (post)socialist city? *Cities*, 32, S29–S38.
- IPBES (2018). The IPBES regional assessment report on biodiversity and ecosystem services for Europe and Central Asia. In M. Rounsevell, M. Fischer, A. Torre-Marín Rando, & A. Mader (Eds.). *Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany* (pp. 892).
- Jones, K. B., Zurlini, G., Kienast, F., Petrosillo, I., Edwards, T., Wade, T. G., ... Zaccarelli, N. (2013). Informing landscape planning and design for sustaining ecosystem services from existing spatial patterns and knowledge. *Landscape Ecology*, 28(6), 1175–1192.
- Kaczorowska, A., Kain, J.-H., Kronenberg, J., & Haase, D. (2016). Ecosystem services in urban land use planning: Integration challenges in complex urban settings—Case of Stockholm. *Ecosystem Services*, 22, 204–212.
- Kopperoinen, L., Itkonen, P., & Niemelä, J. (2014). Using expert knowledge in combining green infrastructure and ecosystem services in land use planning: An insight into a new place-based methodology. *Landscape Ecology*, 29(8), 1361–1375.
- Lamy, T., Liss, K. N., Gonzalez, A., & Bennett, E. M. (2016). Landscape structure affects the provision of multiple ecosystem services. *Environmental Research Letters*, 11(12), 124017.
- Lautenbach, S., Mupepele, A.-C., Dormann, C. F., Lee, H., Schmidt, S., Scholte, S. S. K., ... Volk, M. (2019). Blind spots in ecosystem services research and challenges for implementation. *Regional Environmental Change*.
- Mace, G. M., Norris, K., & Fitter, A. H. (2012). Biodiversity and ecosystem services: A multilayered relationship. *Trends in Ecology & Evolution*, 27(1), 19–26.
- Martin, E. A., Dainese, M., Clough, Y., Báldi, A., Bommarco, R., Gagic, V., ... Steffan-Dewenter, I. (2019). The interplay of landscape composition and configuration: New pathways to manage functional biodiversity and agroecosystem services across Europe. *Ecology Letters*, 22(7), 1083–1094.
- Mitchell, M. G. E., Suarez-Castro, A. F., Martinez-Harms, M., Maron, M., McAlpine, C., Gaston, K. J., ... Rhodes, J. R. (2015). Reframing landscape fragmentation's effects on ecosystem services. *Trends in Ecology & Evolution*, 30(4), 190–198.
- Mörting, U. M., Balfors, B., & Knol, W. C. (2007). Landscape ecological assessment: A tool for integrating biodiversity issues in strategic environmental assessment and planning. *Journal of Environmental Management*, 82(4), 457–470.
- Nadin, V., & Stead, D. (2008). European spatial planning systems, social models and learning. *disP – The Planning Review*, 44(172), 35–47.
- Niemelä, J., Saarela, S.-R., Söderman, T., Koppenroinen, L., Yli-Pelkonen, V., Väre, S., & Kotze, D. J. (2010). Using the ecosystem services approach for better planning and conservation of urban green spaces: A Finland case study. *Biodiversity and Conservation*, 19(11), 3225–3243.
- Oliveira, E., & Hersperger, A. M. (2018). Governance arrangements, funding mechanisms and power configurations in current practices of strategic spatial plan implementation. *Land Use Policy*, 76, 623–633.
- Opdam, P., Albert, C., Fürst, C., Grêt-Regamey, A., Kleemann, J., Parker, D., La Rosa, D., Schmidt, K., Villamor Grace, B., Walz, A., 2015, Ecosystem services for connecting actors – lessons from a symposium, in: Change and Adaptation in Socio-Ecological Systems.
- Opdam, P., Nassauer, J. I., Wang, Z., Albert, C., Bentrup, G., Castella, J.-C., ... Swaffield, S. (2013). Science for action at the local landscape scale. *Landscape Ecology*, 28(8), 1439–1445.
- Partidario, M. R., & Gomes, R. C. (2013). Ecosystem services inclusive strategic environmental assessment. *Environmental Impact Assessment Review*, 40, 36–46.
- Petřík, P., Fanta, J., & Petřtík, M. (2015). It is time to change land use and landscape management in the czech republic. *Ecosystem Health and Sustainability*, 1(9), 1–6.
- Ring, I., Sandström, C., Acar, S., Adeishvili, M., Albert, C., Allard, C., ... Simoncini, R. (2018). Chapter 6: Options for governance and decision-making across scales and sectors. In M. Rounsevell, M. Fischer, A. Torre-Marín Rando, & A. Mader (Eds.). *The IPBES regional assessment report on biodiversity and ecosystem services for Europe and Central Asia* (pp. 661–802). Bonn, Germany: Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.
- Rozas-Vásquez, D., Fürst, C., Geneletti, D., & Almendrala, O. (2018). Integration of ecosystem services in strategic environmental assessment across spatial planning scales. *Land Use Policy*, 71, 303–310.
- Rubio, M. C., Rubio, C., Salomón, M. A., & Abraham, E. (2017). Conservation of ecosystem services in high-altitude Andean wetlands: Social participation in the creation of a natural protected area. *Ecología Austral*, 27(1-bis), 177–192.
- Ruckelshaus, M., McKenzie, E., Tallis, H., Guerry, A., Daily, G., Kareiva, P., ... Bernhardt, J. (2015). Notes from the field: Lessons learned from using ecosystem service approaches to inform real-world decisions. *Ecological Economics*, 115, 11–21.
- Schröter-Schlaack, C., & Blumentrath, S. (2011). Direct regulation for biodiversity conservation. In I. Ring, & C. Schröter-Schlaack (Eds.). *Instrument mixes for biodiversity policies, POLICYMIX Report, Issue No. 2/2011*. Leipzig, Germany: Helmholtz Centre for Environmental Research – UFZ.
- Scolozzi, R., Morri, E., & Santolini, R. (2012). Delphi-based change assessment in ecosystem service values to support strategic spatial planning in Italian landscapes. *Ecological Indicators*, 21, 134–144.
- Spyra, M., Kleemann, J., Cetin, N. I., Vázquez Navarrete, C. J., Albert, C., Palacios-Agundez, I., ... Fürst, C. (2019). The ecosystem services concept: A new Esperanto to facilitate participatory planning processes? *Landscape Ecology*, 34(7), 1715–1735.
- Sverdrup-Thygeson, A., Søgaard, R., Rusch, G. M., & Barton, D. N. (2014). Spatial overlap between environmental policy instruments and areas of high conservation value in forest. *PLoS ONE*, 9(12), e115001.
- Syrbe, R.-U., & Walz, U. (2012). Spatial indicators for the assessment of ecosystem services: Providing, benefiting and connecting areas and landscape metrics. *Ecological Indicators*, 21, 80–88.
- Trepel, M. (2010). Assessing the cost-effectiveness of the water purification function of wetlands for environmental planning. *Ecological Complexity*, 7(3), 320–326.
- UNECE. (2008). Spatial Planning – Key Instrument for Development and Effective Governance with Special Reference to Countries in Transition, United Nations Economic Commission for Europe – UNECE. *Report, ECE/HBP/146*.
- Uthes, S., Matzdorf, B., Müller, K., & Kaechele, H. (2010). Spatial targeting of agri-environmental measures: Cost-effectiveness and distributional consequences. *Environmental Management*, 46(3), 494–509.
- Veidemane, K., Ruskule, A., Strake, S., Purina, I., Aigars, J., Sprukta, S., ... Klepers, A. (2017). Application of the marine ecosystem services approach in the development of the maritime spatial plan of Latvia. *International Journal of Biodiversity Science, Ecosystem Services & Management*, 13(1), 398–411.
- von Haaren, C., & Albert, C. (2011). Integrating ecosystem services and environmental planning: Limitations and synergies. *International Journal of Biodiversity Science, Ecosystem Services & Management*, 7(3), 150–167.
- von Haaren, C., Albert, C., & Galler, C. (2016). Spatial and landscape planning: A place for ecosystem services. In M. Potschin, R. Haines-Young, R. Fish, & R. K. Turner (Eds.). *Routledge handbook of ecosystem services* (pp. 568–581). London, UK: Routledge.
- von Haaren, C., & Reich, M. (2006). The German way to greenways and habitat networks. *Landscape and Urban Planning*, 76(1), 7–22.
- Yigitcanlar, T., & Teriman, S. (2015). Rethinking sustainable urban development: Towards an integrated planning and development process. *International Journal of Environmental Science and Technology*, 12(1), 341–352.