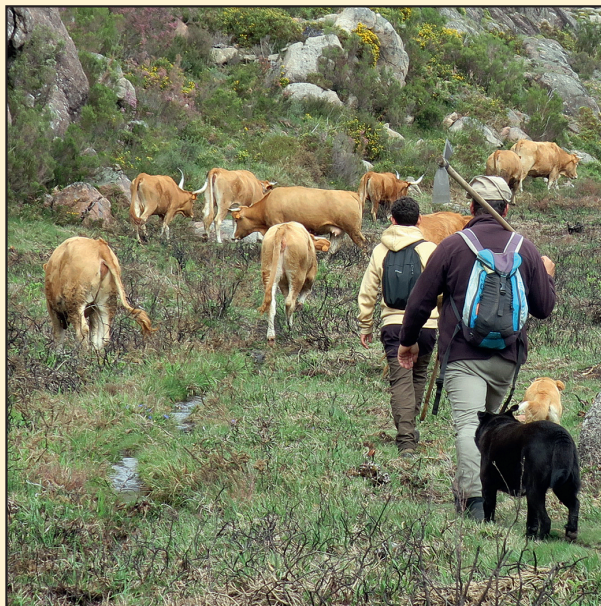


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Front cover photography: Vezeira, the traditional migration of livestock, from the village of Pincães (Montalegre, Portugal) to high-altitude pastures is a community event organized to revive pastoral traditions and involve younger generations (photograph: Joana Nogueira).

Fotografija na naslovnici: Vezeira, tradicionalna selitev živine iz vasi Pincães na Portugalskem na visokogorske pašnike, ki jo izvaja lokalna skupnost, je namenjena oživitvi pašnih tradicij in vključevanju mlajših generacij (fotografija: Joana Nogueira).

COMMON LANDS, SHARED FUTURES: THE IMPORTANCE OF ECOSYSTEM SERVICES, JUSTICE, AND SUSTAINABILITY THROUGH COMMUNITY LAND MANAGEMENT

Daniela Ribeiro, Mateja Šmid Hribar, Conor Kretsch



The Konjščica mountain pasture and its surrounding in the heart of the Triglav National Park.

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Daniela Ribeiro¹, Mateja Šmid Hribar¹, Conor Kretsch²

Common lands, shared futures: The importance of ecosystem services, justice, and sustainability through community land management

ABSTRACT: This editorial article introduces the special issue »The importance of common lands' management for sustaining ecosystem services«. This special issue explores the dynamics of common lands and their role in providing ecosystem services, highlighting the interplay between local management and the environmental and social benefits they engender at both local and regional scales. It addresses an under-explored field through conceptual and empirical studies on provisioning and regulating ecosystem services of common lands. Effective management relies on the integration of local knowledge and participatory decision-making, yet faces challenges such as lack of recognition in policy, institutional silos, technical capacity and data gaps, cadastral uncertainty and conflict management.

KEYWORDS: commons, collective actions, local communities, nature's contribution to people, ecosystem services, cultural landscape

Skupna zemljišča, soustvarjena prihodnost: pomen ekosistemskih storitev, pravičnosti in trajnosti skozi upravljanje skupnih zemljišč

POVZETEK: Članek uvaja posebno izdajo »Pomen upravljanja skupnih zemljišč za zagotavljanje ekosistemskih storitev«. Ta posebna izdaja raziskuje dinamiko skupnih zemljišč in njihovo vlogo pri zagotavljanju ekosistemskih storitev, pri čemer poudarja medsebojno delovanje lokalnega upravljanja ter okoljske in socialne koristi, ki jih prinašajo na lokalni in regionalni ravni. Ukvarja se s premalo raziskanimi področji ter jih obravnava z uporabo konceptualnih in empiričnih študij o oskrbovalnih in uravnalnih ekosistemskih storitvah skupnih zemljišč. Učinkovito upravljanje temelji na integraciji lokalnega znanja in participativnem odločanju, vendar se sooča z izzivi, kot so pomanjkanje vključevanja v politiko, sektorski pristop, pomanjkanje tehničnih zmogljivosti in podatkov, nejasnost glede katastrskih podatkov in upravljanje konfliktov.

KLJUČNE BESEDE: skupna zemljišča, skupnostne prakse, lokalne skupnosti, prispevek narave ljudem, ekosistemske storitve, kulturna pokrajina

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1 Introduction: Why common lands matter for ecosystem services

The term »commons« originally referred to common lands in medieval Europe, denoting how communities collectively managed essential resources such as forests and pastures. This form of governance is based on commoners, that is on people who share and collectively manage resources (Anderies and Janssen 2013). In this Special issue, we understand commons in two ways: as shared resources (mainly common lands) and also as organisations that collectively govern such resources.

Although traditional commons still exist in some regions, such as the European Alps (Pagot et al. 2025), Portugal (Nogueira et al. 2023), Lapland (Larsson and Pääviö Sjanuja 2022), and Africa (Kaye-Zwiebel and King 2014), Asia (Shimada 2014), and Latin America (Monroy-Sais et al. 2016), numerous commons have disappeared or face pressures from economic shifts, changing social dynamics and political frameworks as well as administrative barriers (Brown 2006; Premrl et al. 2015; Šmid Hribar 2025). Although nowadays the meaning of commons has broadened (Anderies and Janssen 2013), in this special issue we focus on commons as common lands that are managed collaboratively by communities to achieve long-term sustainable management of natural resources in their local environments. By doing this, commons play a vital role in preserving biodiversity (Šmid Hribar 2025) and cultural landscapes (Šmid Hribar et al. 2023; Urbanc et al. 2025), and contribute to the provision of essential ecosystem services such as carbon sequestration (Gomes et al. 2025; Šmid Hribar et al. 2025b), groundwater provision (Bogataj and Frantar 2025), fire protection (Adagói et al. 2025), and food production (Galán et al. 2022). This community stewardship is particularly relevant in the context of current pressures on key natural resources, such as water, air, forests, and biodiversity, which are limited and prone to degradation if mismanaged. As Ostrom (1990) has shown, community-based management can yield better outcomes than individual or state-led approaches when it functions effectively.

While the Special issue »The role of traditional, transforming and new commons in landscapes« (Urbanc et al. 2023) explored various aspects of commons and their role in sustaining traditional agricultural landscapes, this special issue seeks to take a step further by presenting evidence-based research on how collectively governed and managed common lands contribute to ecosystem services. Both research fields, ecosystem services, and commons, focus on the complex interactions between humans and nature. While ecosystem services emphasise the benefits nature provides to people (Costanza et al. 1997), the research on commons explore how communities govern and manage shared resources (Rodela et al. 2019). Based on a literature review of the interaction between commons and ecosystem services, Tucker et al. (2023) emphasise that the most critical gaps in this intersection are the lack of attention to global interdependencies (e.g., international markets, climate change that influences local or regional ecosystem services and common-pool resources governance), the marginalization of equity, justice, and ethics, and the disconnection between analysis and meaningful governance action.

Ecosystem services as well as commons, offer valuable and complementary insights into human–nature interaction and address key environmental challenges to sustainability. However, empirical research on the contribution of commons to ecosystem services remains limited (Barnaud and Muradian 2024). Further research could provide valuable insights into the potential of the commons through spatial analyses and ecosystem services assessments, to integrate these perspectives into relevant nature protection policies and programs, such as the Paris Agreement, the 2030 Agenda for Sustainable Development, the Global Biodiversity Framework, and the EU Biodiversity Strategy for 2030, and inform the development of appropriate financial compensation and incentive mechanisms to encourage community engagement (Rodela et al. 2019).

Given the research gaps mentioned above, the aim of this special issue is to provide up-to-date, primarily empirical research that highlights the links between common lands governance and the provision of ecosystem services. In chapter 2 of this article, the significance of inclusive governance, the recognition of community rights, and the equitable distribution of benefits in the administration of common lands are addressed, as central to their sustainable administration and to the long-term maintenance of both ecological integrity and social equity. The text goes on to discuss how justice and equity are both challenges and necessary conditions for the conservation and enhancement of ecosystem services. The chapter 3 provides a synopsis of the contributions made to this special issue. The final chapter examines the key messages and insights pertaining to common lands and their contribution to ecosystem services, with a particular focus on the bureaucratic and institutional barriers to collective management.

2 Justice, equity, and governance in commons management

The concept of commons has played an important role in the development of science and policy on the conservation and sustainable use of natural resources, including biodiversity, linking community perspectives on issues of natural resources, livelihood security, culture and governance. The biodiversity crisis is frequently discussed as an issue of global justice, reflecting concerns about rights of access to ecosystem services. The loss and unsustainable use of biodiversity and ecosystem services is both a driver of inequality, and a symptom of it (Timmer and Juma 2005; Rees 2008; Lenzi et al. 2023). Communities facing the loss of access to essential ecosystem services resulting from ecosystem degradation (or exclusion from private lands) may become more vulnerable to poverty, food and nutrition insecurity, the impacts of natural hazards, and illness, in some cases being forced to abandon traditional livelihoods, or pushed towards unsustainable modes of resource exploitation (Millennium Ecosystem Assessment 2005). Commons can provide an important place- and community-based setting to examine these issues and explore equitable solutions. However, there are many examples of nature conservation policy or interventions driving inequalities, where the rights of land users and their access to natural resources are marginalised by strict protection regimes (Colchester 2004; Tauli-Corpuz et al. 2020). Such cases overlook the vital role which commoners (and local communities more widely) can play in conservation and sustainable use of natural resources and associated ecosystem services, as long as their autonomy, values, perspectives, and historical, cultural and ecological knowledge are respected (Iordăchescu 2022; Dawson et al. 2024).

Since the reports of the Millennium Ecosystem Assessment (2005) provided policy makers with a clear framework for understanding the links between ecosystems and human well-being, and with further exploration of the ways in which those linkages are determined by national, regional, and local perspectives, increased attention has been given to the importance of equitable and inclusive approaches to conservation that acknowledge, respect, invite and account for the voices and perspectives of diverse communities, actors and stakeholders (Sikor 2013; Tallis and Lubchenco 2014; Tauli-Corpuz et al. 2020), including commoners (Rodgers and Mackay 2017). Unfortunately, experience across continents has demonstrated that injustice can also result from the implementation of conservation policies (Bagnoli et al. 2008; Martin et al. 2013; Shoreman-Ouimet and Kopnina 2015; Pascual et al. 2021). In the same way that climate action plans aim for a »just transition« to a low carbon future, strategies for restoring biodiversity and ecosystem services must avoid creating or exacerbating inequality (Mabon et al. 2024; Brown et al. 2025). Commons provide important cases for exploring and addressing these issues and for developing ethical transformative approaches (Iordăchescu 2022).

Any form of natural resource management and governance may raise a diversity of concerns regarding equity, equality and rights. Understanding how these concerns may arise, their geographic and temporal scales, whom they may affect or be affected by, and how they may be addressed in a sustainable manner, generally requires careful consideration of a range of social, cultural, environmental, and/or economic factors. One of the key challenges inherent in the successful implementation of biodiversity and nature conservation policies is the difficulty in co-ordination across different spatial, temporal and administrative scales. In many cases, the costs of both biodiversity loss and conservation are felt most acutely and immediately at the local level, and unless localised implementation efforts can account for the diversity of perspectives held within local communities, such efforts not only risk failure, but loss of community support and social licence (Paloniemi et al. 2012; Martin et al. 2013). In this policy context, commons present a particularly important scale for local, community-led ecosystem management. Molnár et al. (2023) have noted that collaborative approaches to resource management can promote fair and effective results. However, this is not guaranteed, and the intent must be supported by a careful consideration of the diversity of perspectives, cultures and struggles within communities (Harmáčková et al. 2022; Koch et al. 2023).

In her 2009 article, Ellinor Ostrom provided a review of responses to Hardin's original theory of the tragedy of the commons, highlighting increasing evidence that the challenge of effectively and sustainably managing commons' resources may be overcome when users communicate to develop a system of governance, based on a set of rules upholding a form of collective self-interest (Ostrom 2009). However, such systems may be contested or fail if they do not account appropriately for the diversity of user experience, needs, local knowledge and world views that may guide their individual conceptions of fair use. Armitage (2008) addressed the importance of understanding the specific social and cultural contexts which shape not only individual approaches but also the readiness of existing governance systems to adapt in

order to meet sustainability challenges. A review by Loos et al. (2023) further notes the importance of recognising the multiple values attributed to ecosystem services which may be held within any community, and of attempting to work towards a common approach to governance of natural resources, whilst also addressing the ways these approaches may be complicated by local political perspectives, history, or trends.

For example, Šmid Hribar et al. (2018) have highlighted the role of historic experiences (at a local or national scale), both political and cultural, in determining attitudes to common land in Slovenia (path dependency). History and collective memory have a strong influence on perceptions of value and attitudes to usage and access rights, and landscapes and associated natural resources have deep significance beyond values to lives and livelihoods. However, cultural ecosystem services – particularly the ways in which habitats, ecosystems and landscapes are key to a shared sense of place and identity with a community – are often overlooked or marginalised in land use and development planning (Tengberg et al. 2012; Eliasson et al. 2022).

Addressing these issues not only demands inclusive and equitable processes in commons governance, but recognition of the social, cultural, political and historic contexts which influence the relationships between communities, ecosystems and well-being.

3 Overview of the special issue contributions

This compendium commences with an overview of the extant academic literature, which is followed by empirical contributions on the provisioning and regulating ecosystem services of common lands.

The systematic literature review by Ng et al. (2025) in this issue traces the evolving academic discourse on common land management and ecosystem services. The analysis of 53 empirical articles emphasises the central role of management practices to the provision of ecosystem services and the growing importance of traditional and innovative collective approaches. The study proposes a conceptual framework to elucidate the manner in which management structures and ecosystem services interact to generate socio-economic benefits. It also emphasises the importance of integrated strategies for improving the resilience and sustainability of common lands. The article provides a solid conceptual foundation for the empirical contributions that follow.

The second article examines the benefits of groundwater and its recharge in common lands in Slovenia's Primorska region. Bogataj and Frantar (2025) used the mGROWA hydrological model to estimate the quantity and dynamics of groundwater recharge over a 50-year period (1972–2023), focusing on the supply side of groundwater ecosystem services. The findings show that trends in groundwater recharge on common lands are generally negative, indicating rising variability in groundwater recharge, with regional differences between the Alpine and Sub-Mediterranean areas of Primorska. Forests, representing the predominant land use and covering more than 12% of common lands, play a vital role in maintaining groundwater recharge. The study also identifies a strong spatial correlation between common lands and water-protected areas, with overlaps reaching 18% in the Alpine area and 78% in the Sub-Mediterranean area. These results highlight the functional interdependence between land management, forest cover, and groundwater systems. The authors argue that agrarian communities play a significant role in maintaining these processes as collective landholders through their stewardship of natural resources and propose benefit-sharing mechanisms that would integrate them into groundwater governance.

The potential for carbon sequestration in common lands is the focus of two studies. These studies utilise remote sensing data and net primary production (NPP) to analyse the carbon sequestration capacity of these areas. The Portuguese case study by Gomes et al. (2025) combines stakeholder perceptions with quantitative remote sensing data to bridge the gap between social and biophysical perspectives on ecosystem services provision. The study reveals that while local communities often underestimate the ecosystem services potential of communal lands, these areas nonetheless play a vital role in climate regulation. A quantitative analysis was conducted on the carbon sequestration potential of common lands in the Mondim de Basto Municipality. This analysis estimated a total carbon sequestration capacity of 92,351 tons for the year 2023. In Portugal, approximately 14% of forests are situated on communal lands, thereby designating these areas as substantial potential carbon reservoirs. The article places significant emphasis on the importance of enhancing the dissemination of information regarding ecosystem service benefits. The overarching objective of this enhancement is to foster community engagement and facilitate informed

decision-making processes. The authors also emphasise that financial incentives for carbon sequestration could promote sustainable land management while generating new economic opportunities for rural populations. The article demonstrates how the integration of remote sensing with participatory approaches can facilitate the incorporation of communal lands into national climate and sustainability strategies.

Šmid Hribar et al. (2025b) assess carbon sequestration in the Triglav National Park area, which has a fairly high proportion of common lands. Although the study uses MODIS NPP data to analyse carbon sequestration capacity, the data were downscaled to a resolution of 10 m to capture fine-scale forest and agricultural land mosaics in the study area. To this end, a set of predictors that are strongly linked to vegetation productivity dynamics was employed. The assessment demonstrates that, despite the moderate overall carbon sequestration capacity of the common lands in Triglav National Park, the forests and scrublands, characterised by higher productivity, play an important role due to their spatial extent. Therefore, the findings underscore the need to assess both the capacity for carbon sequestration and the spatial extent when evaluating the contribution of land use to carbon dynamics, as high productivity alone does not necessarily result in a greater overall impact at a landscape level. Ultimately, the authors suggest that private forest owners in Slovenia, including agrarian communities, could adopt improved management practices to enhance the carbon sequestration capacity of their forests.

Although this special issue does not include any articles that address cultural ecosystem services specifically, this was not an editorial decision; rather, it reflects the articles that were submitted. This category of ecosystem services has received little attention, which highlights the need to further explore how common lands enable physical, experiential, spiritual, symbolic and other cultural interactions with the natural environment.

4 Conclusion: Key messages and emerging insights

The cases presented demonstrate that common lands function as multi-service structures, supporting the provision, regulation, and cultural ecosystem services. Forests and pastures managed collectively have a significant impact on climate regulation and groundwater recharge, while supporting local practices. Studies from Portugal and Slovenia demonstrate that even where community awareness of ecosystem services is limited, the biophysical contribution of common lands can be substantial (Gomes et al. 2025; Šmid Hribar et al. 2025b). Treating commons as multi-service assets discourages silos interventions and supports integrated landscape policy.

This evidence serves to reinforce the central proposition outlined in chapter 2. The prerequisites for achieving sustainable ecosystem services outcomes are inclusive local governance, recognition of rights, and equitable benefit-sharing. Where tenure is clearly defined and rules are negotiated collectively, common lands have been shown to provide ecosystem services. However, when rules are imposed externally without local legitimacy or community heterogeneity being taken into account, and histories are disregarded, outcomes are frequently fragile and contested (Tucker et al. 2023). The effective management of common lands, therefore, necessitates the implementation of procedurally and substantively just processes (Gomes et al. 2025).

From a methodological perspective, the articles demonstrate the advantages of combining biophysical models and Earth observation data (e.g., NPP-based carbon estimates and groundwater recharge modeling) with social research and local knowledge (e.g., qualitative studies of institutions and meanings). This integration of mixed methods improves the ability to infer the mechanisms by which governance is translated into ecosystem services. Furthermore, it unveils the trade-offs that exist across a range of ecosystem services and groups. It also highlights the need for capacity building, as communities can rarely shoulder the technical burden of monitoring alone.

Despite the existence of significant policy frameworks that refer to community stewardship, the recognition of common lands as operational governance units remains inconsistent and understudied (Gomes 2023; Gomes et al. 2025; Bogataj and Frantar 2025). This fragmentation is evident in parallel funding streams, inconsistent eligibility rules for community entities and ecosystem services assessments that privilege individual or state tenure. This has resulted in underinvestment in common lands and the failure to capitalise on cost-effective opportunities for the delivery of ecosystem services. A pragmatic approach would be to

integrate commons into existing instruments by treating recognised commoners as eligible managers for ecosystem services-related programmes.

Cultural ecosystem services are often considered to be of great importance for stewardship. Nevertheless, these ecosystem services are often underrepresented in landscape management and planning (Plieninger et al. 2015), as is the case with this special issue.

The co-production of research with communities has been demonstrated to enhance the precision of research questions, augment the relevance of data, and accelerate its uptake (Barnaud et al. 2023; Barton et al. 2024). Interdisciplinary teams have the capacity to translate local practices into policy-relevant evidence without compromising the diversity of values. The objective is not to replace local knowledge with models, but rather to combine them in a format that is useful for landscape management and decision-making (Šmid Hribar et al. 2025a).

Evidence indicates the presence of recurring impediments that hinder the potential of common lands to deliver ecosystem services. These impediments can be categorised as follows: **First**, it is important to note that common lands lack a recognised form within policy and planning frameworks (Bogataj and Frantar 2025). **Second**, the domains of forestry, water, agriculture and cultural heritage are the responsibility of different agencies, each of which is focused on achieving its own distinct objectives (Gomes et al. 2025). In contrast, common lands and ecosystems function across these established administrative boundaries. **Third**, it is evident that financial schemes, including the carbon market, need a level of technical expertise that exceeds the local community's current capabilities (Gomes et al. 2025). **Fourth**, historical arrangements, cadastral gaps or unclear liability have a deterring effect on collective action (Gomes et al. 2025). **Fifth**, local communities and decision-makers are generally without recourse to data, modelling tools and training (Gomes et al. 2025; Šmid Hribar et al. 2025a).

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5 References

- Adagóí, I., Xavier, P., Pena, S. 2025: Planning a sustainable, fire-resilient landscape on commons lands. In: Planning Rural Landscapes: Green Infrastructure and Ecosystem Services Nexus. *Routledge Research in Planning and Urban Design*. Routledge. <https://doi.org/10.4324/9781003583585-23>
- Anderies, J. M., Janssen, M. 2013: Sustaining the Commons. Center for the Study of Institutional Diversity, Arizona State University.
- Armitage, D. 2008: Governance and the commons in a multi-level world. *International Journal of the Commons* 2-1. <https://doi.org/10.18352/ijc.28>
- Bagnoli, P., Goeschl, T., Kovács, E. 2008: People and biodiversity policies: Impacts, issues and strategies for policy action. OECD Publishing.
- Barnaud, C., De Longueville, F., Gonella, G., Antona, M., Dendoncker, N., Waylen, K. A. 2023: Participatory research on ecosystem services in the face of disputed values and other uncertainties: A review. *Ecosystem Services* 63. <https://doi.org/10.1016/j.ecoser.2023.101551>
- Barnaud, C., Muradian, R. 2024: Ecosystem services and collective action: New commons, new governance challenges. *Ecosystem Services* 70. <https://doi.org/10.1016/j.ecoser.2024.101662>
- Barton, D. N., Immerzeel, B., Brander, L., Grêt-Regamey, A., Kato Huerta, J., Kretsch, C., Le Clech, S. et al. 2024: Increasing uptake of ecosystem service assessments: Best practice check-lists for practitioners in Europe. *One Ecosystem* 9. <https://doi.org/10.3897/oneeco.9.e120449>
- Bogataj, N., Frantar, P. 2025: Groundwater ecosystem services on collectively managed lands: The Slovenian case of groundwater recharge. *Acta geographica Slovenica* 65-3. <https://doi.org/10.3986/AGS.14319>

- Brown, D., Martin, A., Fisher, J. A., Gingembre, M. 2025: Towards a transformative approach to just rural transitions: Landscape restoration in the Scottish highlands. *Environment and Planning E: Nature and Space* 8-6. <https://doi.org/10.1177/25148486251367163>
- Brown, K. M. 2006: New challenges for old commons: The role of historical common land in contemporary rural spaces. *Scottish Geographical Journal* 122-2. <https://doi.org/10.1080/00369220600917412>
- Colchester, M. 2004: Conservation policy and indigenous peoples. *Environmental Science & Policy* 7-3. <https://doi.org/10.1016/j.envsci.2004.02.004>
- Costanza, R., d'Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K. et al. 1997: The value of the world's ecosystem services and natural capital. *Nature* 387. <https://doi.org/10.1038/387253a0>
- Dawson, N. M., Coolsaet, B., Bhardwaj, A., Booker, F., Brown, D., Lliso, B., Loos, J. et al. 2024: Is it just conservation? A typology of Indigenous peoples' and local communities' roles in conserving biodiversity. *One Earth* 7-6. <https://doi.org/10.1016/j.oneear.2024.05.001>
- Eliasson, I., Fredholm, S., Knez, L., Gustavsson, E. 2022: The need to articulate historic and cultural dimensions of landscapes in sustainable environmental planning – A Swedish Case Study. *Land* 11-11. <https://doi.org/10.3390/land11111915>
- Galán, E., Garmendia, E., García, O. 2022: The contribution of the commons to the persistence of mountain grazing systems under the Common Agricultural Policy. *Land Use Policy* 117. <https://doi.org/10.1016/j.landusepol.2022.106089>
- Gomes, P. 2023: Os baldios como suporte de um modelo de governança territorial de âmbito local. *Poder Local* 161.
- Gomes, P., Ribeiro, D., Lopes, D. 2025: Assessing the contribution of communal lands to ecosystem services: a quantification of carbon sequestration in a case study from Portugal. *Acta geographica Slovenica* 65-3. <https://doi.org/10.3986/AGS.14339>
- Harmáčková, Z. V., Blättler, L., Aguiar, A. P. D., Daněk, J., Krpec, P., Vačkářová, D. 2022: Linking multiple values of nature with future impacts: Value-based participatory scenario development for sustainable landscape governance. *Sustainability Science* 17-3. <https://doi.org/10.1007/s11625-021-00953-8>
- Iordăchescu, G. 2022: Convivial conservation prospects in Europe – from wilderness protection to reclaiming the commons. *Conservation and Society* 20-2. https://doi.org/10.4103/cs.cs_35_21
- Kaye-Zwiebel, E., King, E. 2014: Kenyan pastoralist societies in transition: Varying perceptions of the value of ecosystem services. *Ecology and Society* 19-3. <https://doi.org/10.5751/ES-06753-190317>
- Koch, L., Gorris, P., Prell, C., Pahl-Wostl, C. 2023: Communication, trust and leadership in co-managing biodiversity: A network analysis to understand social drivers shaping a common narrative. *Journal of Environmental Management* 336. <https://doi.org/10.1016/j.jenvman.2023.117551>
- Larsson, J., Päiviö Sjanuja, E.-L. 2022: Self-governance and Sami communities: Transitions in early modern natural resource management. Palgrave Macmillan.
- Lenzi, D., Balvanera, P., Arias-Arévalo, P., Eser, U., Guibrunet, L., Martin, A., Muraca, B., Pascual, U. 2023: Justice, sustainability, and the diverse values of nature: Why they matter for biodiversity conservation. *Current Opinion in Environmental Sustainability* 64. <https://doi.org/10.1016/j.cosust.2023.101353>
- Loos, J., Benra, F., Berbés-Blázquez, M., Bremer, L. L., Chan, K. M., Egoh, B., Locatelli, B. et al. 2023: An environmental justice perspective on ecosystem services. *Ambio* 52-3. <https://doi.org/10.1007/s13280-022-01812-1>
- Mabon, L., Layard, A., De Vito, L., Few, R., Hatzisavvidou, S., Selomane, O., Marshall, A. et al.: What does a just transition mean for urban biodiversity? Insights from three cities globally. *Geoforum* 154. <https://doi.org/10.1016/j.geoforum.2024.104069>
- Martin, A., McGuire, S., Sullivan, S. 2013: Global environmental justice and biodiversity conservation. *The Geographical Journal* 179-2. <https://doi.org/10.1111/geoj.12018>
- Millennium Ecosystem Assessment 2005: Ecosystems and Human Well-being: Synthesis. Island Press.
- Molnár, Z., Fernández-Llamazares, Á., Schunko, C., Teixidor-Toneu, I., Jarić, I., Díaz-Reviriego, I., Ivascu, C. et al. 2023: Social justice for traditional knowledge holders will help conserve Europe's nature. *Biological Conservation* 285. <https://doi.org/10.1016/j.biocon.2023.110190>
- Monroy-Sais, S., Castillo, A., Garcia-Frapolli, E., Ibarra-Manriquez, G. 2016: Ecological variability and rule-making processes for forest management institutions: A socialecological case study in the Jalisco coast, Mexico. *International Journal of the Commons* 10. <https://doi.org/10.18352/ijc.672>

- Ng, S.-L., Hong, N.-M., Chen, Y.-J. 2025: The nexus of common lands and ecosystem services: A systematic review and thematic insights. *Acta geographica Slovenica* 65-3. <https://doi.org/10.3986/AGS.14327>
- Nogueira, J., Araújo, J. P., Alonso, J. M., Simões, S. 2023: Common lands, landscape management and rural development: A case study in a mountain village in northwest Portugal. *Acta geographica Slovenica* 63-3. <https://doi.org/10.3986/AGS.11081>
- Ostrom, E. 1990: Governing the commons: The evolution of institutions for collective action. Cambridge University Press.
- Ostrom, E. 2009: A general framework for analyzing sustainability of social-ecological systems. *Science* 325-5939. <https://doi.org/10.1126/science.1172133>
- Pagot, G., Šmid Hribar, M., Rail, L. F., Walters, G., Hymas, O., Liechti, K., Haller, T. et al. 2025: Territories of commons: A review of common land organizations and institutions in the European Alps. *Environmental Research Letters* 20-6. <https://doi.org/10.1088/1748-9326/add1f4>
- Paloniemi, R., Apostolopoulou, E., Primmer, E., Grodzinska-Jurcak, M., Henle, K., Ring, I., Kettunen, M. et al. 2012: Biodiversity conservation across scales: Lessons from a science-policy dialogue. *Nature Conservation* 2. <https://doi.org/10.3897/natureconservation.2.3144>
- Pascual, U., Adams, W. M., Díaz, S., Lele, S., Mace, G. M., Turnhout, E. 2021: Biodiversity and the challenge of pluralism. *Nature Sustainability* 4-7. <https://doi.org/10.1038/s41893-021-00694-7>
- Plieninger, T., Bieling, C., Fagerholm, N., Byg, A., Hartel, T., Hurley, P., López-Santiago, C. A. et al. 2015: The role of cultural ecosystem services in landscape management and planning. *Current Opinion in Environmental Sustainability* 14. <https://doi.org/10.1016/j.cosust.2015.02.006>
- Premrl, T., Udovč, A., Bogataj, N., Krč, J. 2015: From restitution to revival: A case of commons re-establishment and restitution in Slovenia. *Forest Policy and Economics* 59. <https://doi.org/10.1016/j.forpol.2015.05.004>
- Rees, W. E. 2008: Human nature, eco-footprints and environmental injustice. *Local Environment* 13-8. <https://doi.org/10.1080/13549830802475609>
- Rodela, R., Tucker, C. M., Šmid Hribar, M., Sigura, M., Bogataj, N., Urbanc, M., Gunya, A. 2019: Intersections of ecosystem services and common-pool resources literature: An interdisciplinary encounter. *Environmental Science & Policy* 94. <https://doi.org/10.1016/j.envsci.2018.12.021>
- Rodgers, C., Mackay, D. 2017: Creating 'new' commons for the twenty-first century: Innovative legal models for 'green space'. *Journal of Environmental Planning and Management* 61-5,6. <https://doi.org/10.1080/09640568.2017.1333407>
- Shimada, D. 2014: External impacts on traditional commons and present-day changes: A case study of Iriai forests in Yamaguni district, Kyoto, Japan. *International Journal of the Commons* 8-1. <https://doi.org/10.18352/ijc.348>
- Shoreman-Ouimet, E., Kopnina, H. 2015: Reconciling ecological and social justice to promote biodiversity conservation. *Biological Conservation* 184. <https://doi.org/10.1016/j.biocon.2015.01.030>
- Sikor, T. (ed.) 2013: The justices and injustices of ecosystems services. Routledge. <https://doi.org/10.4324/9780203395288>
- Šmid Hribar, M. 2025: Ten years after the new Agrarian Communities Act: The state of agrarian communities in the Gorenjska region. *Geografski vestnik* 97 (in press).
- Šmid Hribar, M., Japelj, A., Rac, I., Vurunič, S., Ribeiro, D. 2025a: Challenges related to stakeholder involvement in the assessment of ecosystem services in protected areas in Slovenia. *One Ecosystem* 10. <https://doi.org/10.3897/oneeco.10.e163691>
- Šmid Hribar, M., Kozina, J., Bole, D., Urbanc, M. 2018: Public goods, common-pool resources, and the commons: The influence of historical legacy on modern perceptions in Slovenia as a transitional society. *Urbani izziv* 29-1. <https://doi.org/10.5379/urbani-izziv-en-2018-29-01-004>
- Šmid Hribar, Ribeiro, D., Villoslada, M. 2025b: The contribution of common lands to carbon sequestration: A case study from Triglav National Park in Slovenia. *Acta geographica Slovenica* 65-3. <https://doi.org/10.3986/AGS.14491>
- Šmid Hribar, M., Urbanc, M., Zorn, M. 2023: Commons and their contribution to sustaining Slovenian cultural landscapes. *Acta geographica Slovenica* 63-3. <https://doi.org/10.3986/AGS.11591>
- Tallis, H., Lubchenco, J. 2014: Working together: A call for inclusive conservation. *Nature* 515-7525. <https://doi.org/10.1038/515027a>

-
- Tauli-Corpuz, V., Alcorn, J., Molnar, A., Healy, C., Barrow, E. 2020: Cornered by PAs: Adopting rights-based approaches to enable cost-effective conservation and climate action. *World Development* 130. <https://doi.org/10.1016/j.worlddev.2020.104923>
- Tengberg, A., Fredholm, S., Eliasson, I., Knez, I., Saltzman, K., Wetterberg, O. 2012: Cultural ecosystem services provided by landscapes: Assessment of heritage values and identity. *Ecosystem Services* 2. <https://doi.org/10.1016/j.ecoser.2012.07.006>
- Timmer, V., Juma, C. 2005: Taking root: Biodiversity conservation and poverty reduction come together in the tropics. *Environment: Science and Policy for Sustainable Development* 47-4. <https://doi.org/10.3200/ENVT.47.4.24-44>
- Tucker, C. M., Šmid Hribar, M., Urbanc, M., Bogataj, N., Gunya, A., Rodela, R., Sigura, M., Piani, L. 2023: Governance of interdependent ecosystem services and common-pool resources. *Land Use Policy* 127. <https://doi.org/10.1016/j.landusepol.2023.106575>
- Urbanc, M., Hori, K., Šmid Hribar, M. 2023: Commons, collective actions and landscapes: A short introduction. *Acta geographica Slovenica* 63-3. <https://doi.org/10.3986/AGS.13206>
- Urbanc, M., Ledinek Lozej, Š., Šmid Hribar, M. 2025: Mountain pastures in the Slovenian Alps: Their role in shaping and sustaining the cultural landscape. In: Discourses on mountains of Montenegro and Slovenia. *Historical Geography and Geosciences*. Springer.