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PER ANGELSTAM • ROBERT AXELSSON

Sustainable Bergslagen

– a landscape approach initiative in Sweden

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Sustainable Bergslagen

– a landscape approach initiative in Sweden

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Contents

Summary	5
Sammanfattning	5
Bergslagen - an introduction	6
Landscape as a social-ecological system	7
Sustainability: data, analyses and visualisation	9
Sustainable Bergslagen for regional development	10
Multi-level collaboration	11
Understanding landscape history	11
Vision and strategic plan	12
Financing a landscape approach initiative	12
Sharing experiences and securing long-term funding	13
Read more	14

Summary

Bergslagen in south-central Sweden is an informal region with a long history of intensive land use. The legacies of more than 2000 years of integrated use of ore, forests and water of major national and international economic importance now involve several challenges for the maintenance of sustainable landscapes. This includes sustainability of rural and urban communities, of green infrastructures for natural capital and human well-being as well as of forests, river basins and mining. In response to this cross-sectoral integration is necessary at multiple levels of public, private and civil sectors, as well as academia and schools. Landscapes need thus to be viewed as integrated socio-ecological systems. Collaboration and continuous learning among actors and stakeholders are needed for sustainable use and management of landscapes' goods, services and values. To support this requires (1) data, monitoring and assessment of different aspects of sustainability, (2) continuous knowledge production about material and immaterial landscape values relevant for the management of ecological, economic, social and cultural dimensions, (3) information and communication using both traditional media, as well as (4) through art and culture. With the vision to contribute to satisfying these requirements the Sustainable Bergslagen initiative emerged gradually since 2004 as a multi-level partnership for sustainable landscapes (www.bergslagen.org). By joining the International Model Forest Network (IMFN), and the network for Long Term Socio-Economic and Ecological Research (LTSER), actors and stakeholders can learn from other regions' sustainable development processes, and make Bergslagen more visible internationally.

Sammanfattning

Bergslagen i södra Mellansverige är en informell region med en lång historia av intensiv markanvändning. Arvet från mer än 2000 år av integrerad användning av malm, skog och vatten av stor nationell och internationell ekonomisk betydelse involverar nu flera utmaningar för upprätthållande av hållbara landskap. Detta inkluderar hållbar stad och landsbygd, fungerande gröna infrastrukturer för bevarande av naturkapital och mänskligt välbefinnande, liksom uthålligt nyttjande av skog, vatten och malm. Detta kräver sektorsövergripande integration på flera nivåer inom offentlig, privat och civil sektor, liksom akademi och skolor. Landskap måste därför ses som integrerade socio-ekologiska system. Samarbeta och kontinuerligt lärande mellan aktörer och intressenter behövs för hållbar användning och förvaltning av landskaps varor, tjänster och värden. För att stödja detta krävs (1) data, uppföljning och utvärdering av olika aspekter av hållbar utveckling, (2) kontinuerlig kunskapsproduktion om materiella och immateriella landskapsvärden som är relevanta för hanteringen av ekologiska, ekonomiska, sociala och kulturella dimensioner, (3) information och kommunikation med hjälp av både traditionella medier, samt (4) genom konst och kultur. Med visionen att bidra till att uppfylla dessa krav uppstod initiativet Sustainable Bergslagen successivt sedan 2004 som ett partnerskap på flera nivåer för hållbara landskap (www.bergslagen.org). Genom att bli medlemmar internationella Model Forest Network (IMFN) 2007, och nätverket för Long Term Socio-Ecological Research (LTSER), kan aktörer och intressenter lära av andra regioners hållbara utvecklingsprocesser, och göra Bergslagen mer synligt internationellt.

Bergslagen - an introduction

Bergslagen is a region of great historical importance to Sweden (Figure 1). For centuries, the integrated use of forests, water and mineral deposits to produce valuable export products shaped the region and formed the base for Swedish economy (Nelson 1913, Seebass 1928, Wieslander 1936, Geijerstam and Nisser 2011). Economic development in Bergslagen has gone through several phases with highs and lows.

Already during the latter half of the 19th century, major structural changes took place as mining and iron production declined (Isacson 2004). Since the 1970s, the restructuring of the traditional heavy industries led to constant job losses in all traditional natural resource dependent sectors. The transition from raw material production and industries to services has been and continues to be a major challenge (Tillväxtverket 2011). Since the restructuring of industries in the 1970s–1990s, Bergslagen has lost a part of its past identity (Ågren 1998). Indeed, in the 1980's, the region Bergslagen was considered as one of the most crises struck areas in Sweden, together with the sparsely populated Norrland in the north (Jakobsson 2009). However, currently, the region is in the process of finding new ways for development, including ecological and cultural heritage values as a base for rural development (Jakobsson 2009). Bergslagen is hence used as a brand with a valuable natural and cultural heritage.

The Bergslagen region is thus interesting in many aspects of sustainability due to a long history of use of natural resources (Angelstam et al. 2013a), and sustainable development as a societal steering process (Ågren 1998). There are indeed several organizations and civic initiatives aiming at sustainable development and sustainability in the informal Bergslagen region (Andersson et al. 2013).

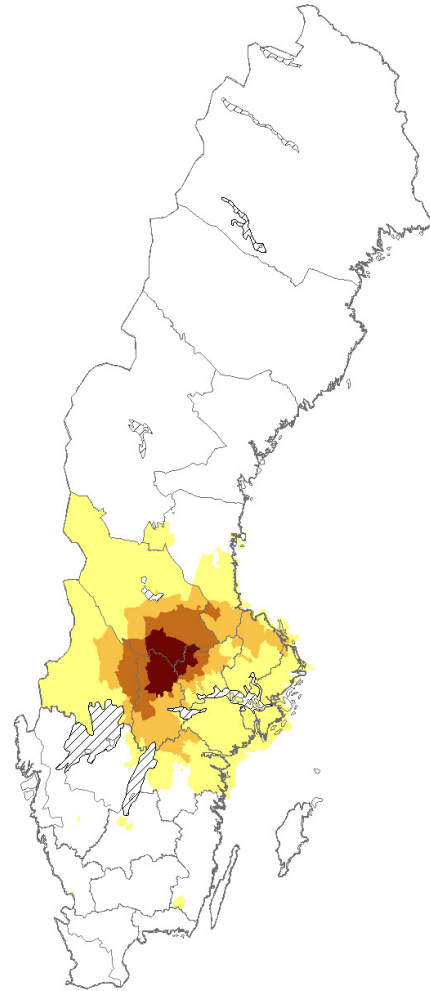


Figure 1. To offer a spatial definition of Bergslagen, we compiled 22 maps with different definitions of Bergslagen (Angelstam et al. 2013a). Using parishes as minimum mapping units, we ranked the parishes according to how many of these 22 Bergslagen definitions they were a part of into four groups.



Figure 2. Collaboration and learning among actors and stakeholders is a fundamental part of a place-based landscape approach. This picture was taken during the kick-off meeting of an international networking project about integrated spatial planning for functional green infrastructures in the Baltic Sea Region. The partners around the table represent Bergslagen in Sweden, Zemgale in Latvia, Pskov in Russia and Braslav in Belarus. Photo and montage: ©Mikael Angelstam.

Landscape as a social-ecological system

The landscape concept is a useful tool for working with development towards sustainability (Angelstam et al. 2013b). Traditionally, landscape was defined as a territory with a specific culture. For example, in the past the administrative units of Sweden were called landscapes and had own legislation. Alexander Humboldt brought the term

“landscape” into the research world (e.g., Minca 2007). He defined landscape both as a real natural phenomenon, and as perceived by people. Landscape is thus a total spatial entity, which involves physical, biological, anthropogenic and perceived dimensions. To learn about landscapes’ sustainability dimensions, and the sustainable development process, requires both quantitative and qualitative methods (Figure 3) to understand both social and ecological systems (Figure 2 and 4).

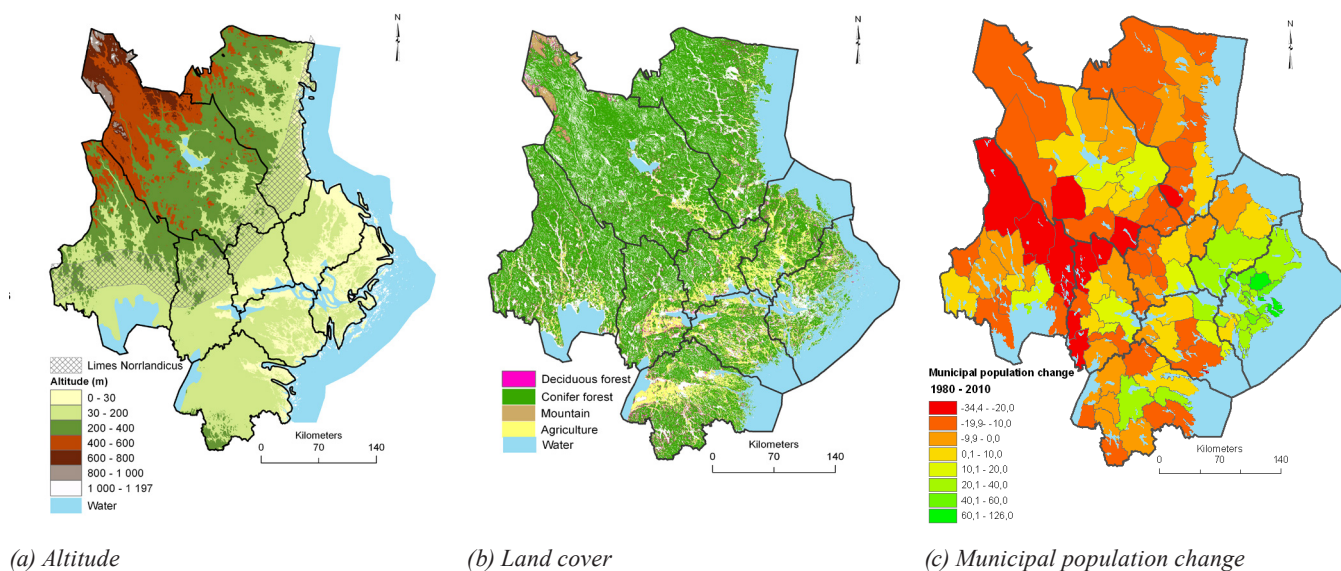


Figure 3. Bergslagen is located in nine counties, which form a steep altitudinal and biogeographic gradient around the “Limes Norrlandicus” (Figure 4). It forms (a) the border between the southernmost boreal coniferous and the northernmost temperate deciduous ecoregions in Sweden. These conditions have produced (b) a steep gradient in the amount of coniferous and deciduous tree species, and of agricultural land. The decline in jobs related to changes in the use of natural resources as minerals, forests and water has led to (c) declining municipal populations in rural landscapes.



Figure 4. The forests in Bergslagen are located at »Limes Norrlandicus« - a steep gradient from hilly to flat terrain in south-central Sweden. Once an island in the sea after the inland ice had retreated about 11000 years BP, this hill is now a protected area with old Scots pine forest in a sea of forests managed for sustained yield wood production. Photo: ©Per Angelstam.

Collaboration and learning

Sustainable Bergslagen is a regional-level initiative that aims to connect stakeholders that represent organisations and networks with the common aim of sustainable landscapes in Bergslagen (Axelsson et al. 2013a, Axelsson and Angelstam 2014). To secure representation, the stakeholders include (1) private sector businesses, (2) public sector organisations, (3) civil sector non-governmental organisations, as well as academia and schools. The Sustainable Bergslagen initiative was formalised in 2009. Partners share the costs and efforts to arrange meetings and activities. When a local partner hosts a meeting all learn about this partner, its vision and challenges. This benefits both their local work, their participation in the Bergslagen region as well as national and international networking. The partnership building process is seen like climbing a ladder of collaborative learning. Inspiration comes from the ladder of citizen participation (Figure 5). The aim is to reach the partnership level where partners at multiple levels know and respect each other and have learned to collaborate as equals. Anyone interested in contributing to sustainable development in Bergslagen is welcome to be a part of Sustainable Bergslagen (Figure 6).

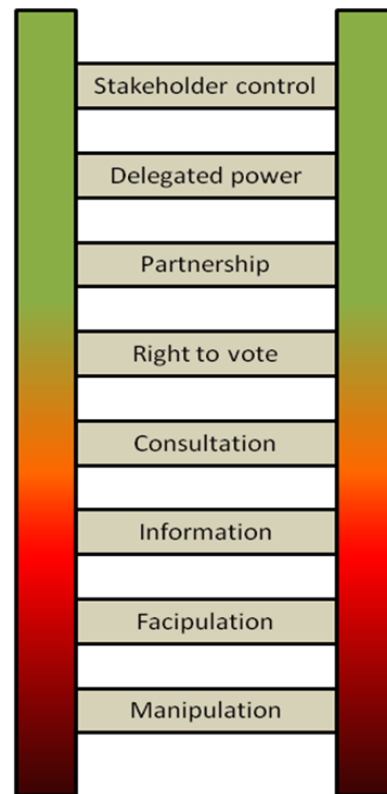


Figure 5. In 1967 Shelley Arnstein wrote about the ladder of citizen participation. In this version we use the same steps but have adapted the terminology to stakeholder collaboration. Green indicates stakeholder power and well developed collaboration while red indicates non-participation (after Arnstein 1967).



Figure 6. Sustainable Bergslagen's meeting in Hallstahammar 2010-12-08. From left to right: Lisa Fröberg (Swedish Church), Lennart Myhrman (Foundation Säfsen Forests), Gunilla Pöchhacker (Bergskraft), Sven Nilsson (Swedish Society for Nature Conservation (SSNC)), Marcus Ryman (Svea Areal Co.), Milis Ivarsson (Avjord Co.), Per Angelstam (SLU), Thomas Kullberg (Lekeberg municipality), Lotta Sartz (Bergskraft), Karin Nilsson (SSNC), Kenneth Andersson (Swedish Forest Agency), Jens Brorsson (Västerås Diocene Forest Co.), Robert Axelsson (SLU), Gunnar Rosén (SSNC), Karl-Erik Johansson (Sala College for Natural Resource Management). Photo: ©Per Angelstam.

Sustainability: data, analyses and visualisation

The sustainability concept has very old roots related to the need to define how intensively natural resources can be used without depleting them. Traditional knowledge in many cultures around the world still reflects what today is termed ecological integrity, biodiversity conservation and ecosystem services. Ultimately, sustainability is linked to the potential of a landscape as a social-ecological system to subsist over time, and continuously provide goods, ecosystem functions, as well as natural and cultural values as a base for regional and rural

development. A critically important aspect of sustainable development as a societal and collaborative learning process based on dialogue is to facilitate participation and learning among stakeholders. This should be based on transparent information about the state and trends of economic, ecological, social and cultural dimensions of sustainability (see examples in Figure 7 and Axelsson et al. 2013b). This will make stakeholders aware of their own landscape's development and support their ability to steer the sustainable development process towards sustainability. Learning about water and catchments is one way (Figure 8 and Törnblom et al. 2011, 2014).

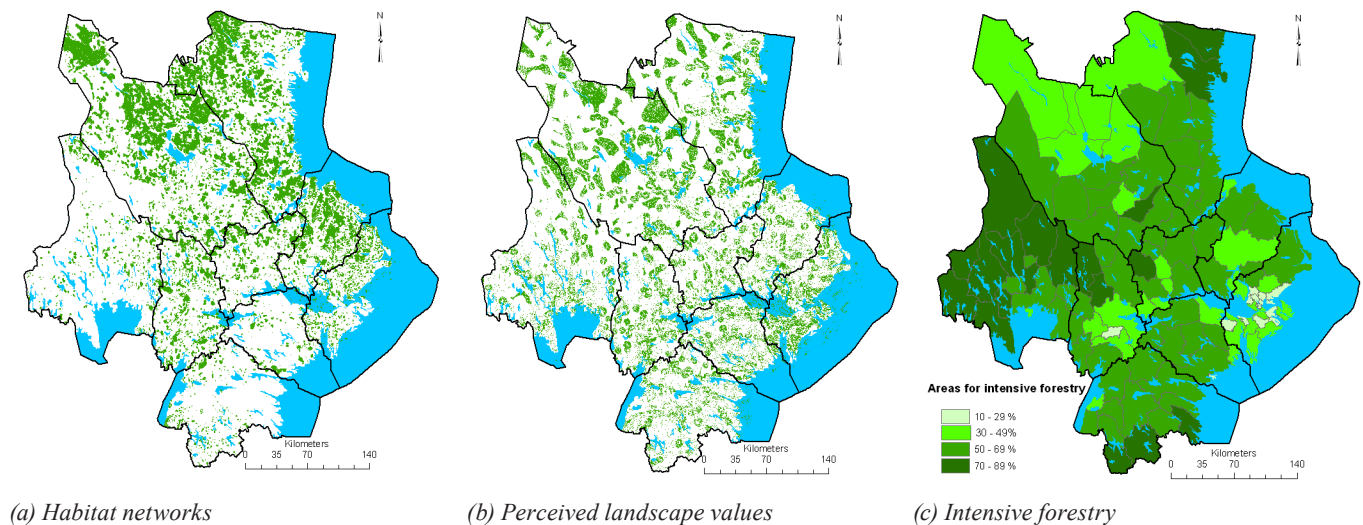


Figure 7. Thematic maps of different sustainability dimensions in nine counties in south-central Sweden (for details see Andersson et al. 2013). Location of functional habitat networks for specialised species in three different forest types (pine, spruce and deciduous) (a). Location of landscape values appreciated by people (quiet forest, old forest near densely build areas and forest-field edges) (b). The areas potentially available for intensive forestry expressed as the proportion of the 119 municipalities (c). This was calculated by merging habitat networks and perceived landscape values, and then subtracting those from the total forest cover.



Figure 8. The many small streams in Bergslagen were crucial for iron production. Once managed by building numerous dams, and as transport infrastructures for log driving, there are now efforts to restore streams for migrating fish. The brown colour of water and the invisible mercury compounds are negative effects of pollution and intensive land use. Photo: ©Per Angelstam.

Sustainable Bergslagen for regional development

The cluster of collaborating stakeholders across multiple levels and sectors in Bergslagen began with the creation of the Foundation Säfsen Forests in 1999. Initialized after 2004, this initiative went regional in 2006-2007 and evolved

into the NGO Sustainable Bergslagen in 2009 (Elbakidze et al. 2010, Axelsson et al. 2013a). Its approach is based on landscape, participation, collaboration and learning towards sustainability (Figure 9), and builds on ideas from the concepts of Model Forest and Long Term Socio-Ecological Research (LTSER).

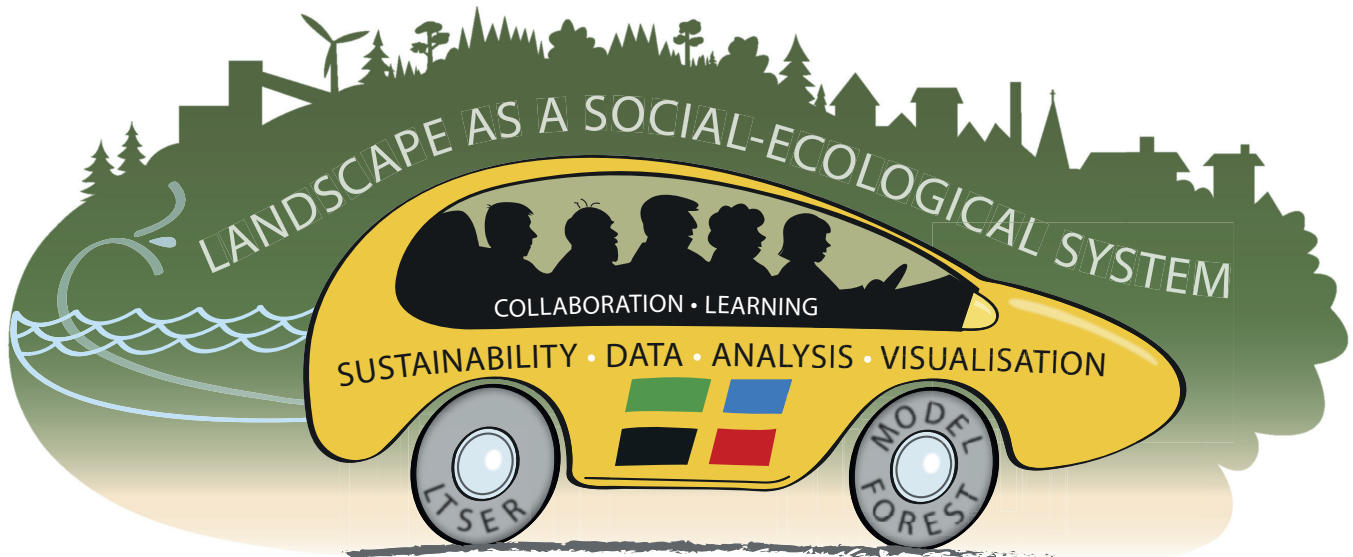


Figure 9. The Sustainable Bergslagen initiative for regional development is based on landscape, participation, collaboration and learning towards sustainability. Joining international networks makes the Sustainable Bergslagen vehicle more efficient, and the region more visible. Illustration: ©Thommy Gustavsson.

Model forest

A Model Forest is a partnership and neutral forum with voluntary participation representing stakeholder interests and values on the landscape. All partners are committed to sustainability, including management of natural resources and landscapes as social and ecological systems. Governance and management in a Model Forest should be representative, participative, transparent and accountable, and promote collaborative work among stakeholders. Each Model Forest has a program of activities that is reflective of the Model Forest's vision, stakeholder needs and values, as well as management and management challenges. Commitment to landscape sustainability in line with the Model Forest philosophy implies a commitment to knowledge-sharing, capacity building and networking both in the own area, and with other initiatives nationally and internationally ¹.

Long-term Socio-Ecological Research (LTSER)

LTSER is a further development of LTER (Long Term Ecosystem Research), which is an initiative where researchers through monitoring follow the development of ecological systems and their sustainability (Singh et al. 2013). By adding the "S" (socio-economic) the connection to and collaboration with the society is emphasized. This means transdisciplinary production of knowledge that includes both social and ecological systems, and collaboration among stakeholders. The aim of a LTSER research platform is to provide evidence-based knowledge and collaborative social learning as a base for sustainable regional development. Social learning in this context is learning among stakeholders to learn how to steer development towards sustainability with uncertainties such as economic globalisation and climate change. The selection criteria for LTSER platforms include: existing research infrastructure, a partnership with stakeholders and the existence of long-term data providing a basis for future research projects and collaborative social learning. Sustainable Bergslagen is the partnership and collaboration platform for LTSER-Bergslagen ².

¹Robert Axelsson and Lennart Myhrman are contact persons for Sustainable Bergslagen as member of the International Model Forest Network, see <http://imfn.net/bergslagen-model-forest>

²Per Angelstam and Lars Lundin are contact persons for LTSER-Bergslagen, see http://data.lter-europe.net/deims/site/LTER_EU_SE_001



Figure 10. Natural resources and landscape values are subject to new styles of governing that operate not only through the apparatuses of the sovereign state. Additionally a range of interconnecting institutions, agencies, partnerships and initiatives have resulted in blurred boundaries between the public, private, and voluntary sectors. The stresses the need for collaboration across sectors and levels of societal steering. Photo: ©Per Angelstam.

Multi-level collaboration

By joining the international networks for Model Forest and LTSER, Sustainable Bergslagen brings experiences from other places to Bergslagen, and makes the region more visible internationally. This provides opportunity and synergies for collaboration both within Bergslagen, and with other regions in Sweden and abroad (Figure 10, Angelstam et al. 2011, Axelsson et al. 2013a). A key challenge is to develop knowledge and learning as a part of an integrated landscape approach towards sustainability. This applies to themes like rural development, commuting, forestry, hydropower, establishment of wind turbine stations, cultural heritage, nature conservation, and wildlife management. In addition there is a new interest in mining due to an increased global demand for metals and minerals. To make the most out of the anticipated new wave of mining, without the historical drawbacks such as environmental debts and loss of social capital, requires collaboration, like in the past when Bergslagen was the core in Sweden's economy (Figure 11).

Understanding landscape history

The name Bergslagen comes from the Swedish words "berg" meaning mine, and the word "lag" with two interpretations. One refers to the legislation associated with mining, and the other to the partnership among private land owners to mine, use streams for kinetic energy, and forests for timber and charcoal production. People joined forces in co-operative ventures known as Bergslag. The members could be accorded the privilege to engage in mining within a particular area, which thus became an administrative unit and itself became known as a Bergslag. This was done by means of a royal decree that came to be known as Bergslagen, the accent being on lagen, which in Swedish means the law. Later, the meaning shifted, so that today it refers almost exclusively to the core geographical region in which mining was and is carried out. To study the transformation of the interaction of humans and the natural environment is a good tool for extracting historical lessons to help address today's challenges in social-ecological systems (Angelstam et al. 2011, 2013c).



Figure 11. The integrated use of ore, forests and water formed the base for regional development in Bergslagen, once the economic backbone of Sweden. View of Skinnskatteberg mansion about 1800, with a saw mill in the foreground, and iron manufacturing downstream the river Hedströmmen.

Vision and strategic plan

The vision for Sustainable Bergslagen is to support development of the Bergslagen region as an attractive place for people to live and work, or where it is easy to commute to jobs in neighbouring areas. This means a region that has a functional transport infrastructure, societal service and a green infrastructure that provides a good quality living environment for its natural and human inhabitants and a base for sustainable economic development. This also includes the development of social capital, i.e. improved relations between people.

A key challenge is integration of different sector's use of the territory of Bergslagen, including municipalities and sectors that consider all different kinds of land use. Sustainable Bergslagen's vision of sustainable landscapes is thus based on using a collaborative learning approach among stakeholders (Axelsson and Angelstam 2014). First, there is a need for continued development of networking towards collaboration among different stakeholders representing different societal sectors, levels and interests (Figure 12 – horizontal). Second, cross-cutting analyses of landscapes' economic, ecological, social and cultural sustainability and communication are needed (Figure 12 – vertical). Together this dual approach can serve as a base for sustainable development of the region. The term integrated landscape approach captures this (Axelsson et al. 2011). Development of a sustainability atlas for Bergslagen, where stakeholders can see and learn about the present sustainability status and the development trends, is in progress.

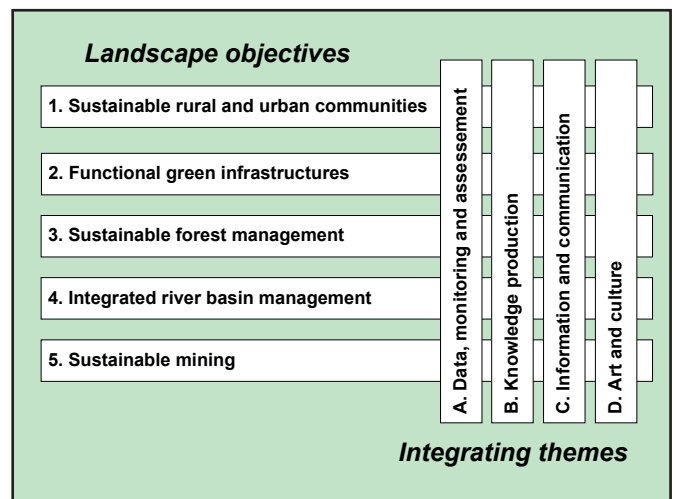
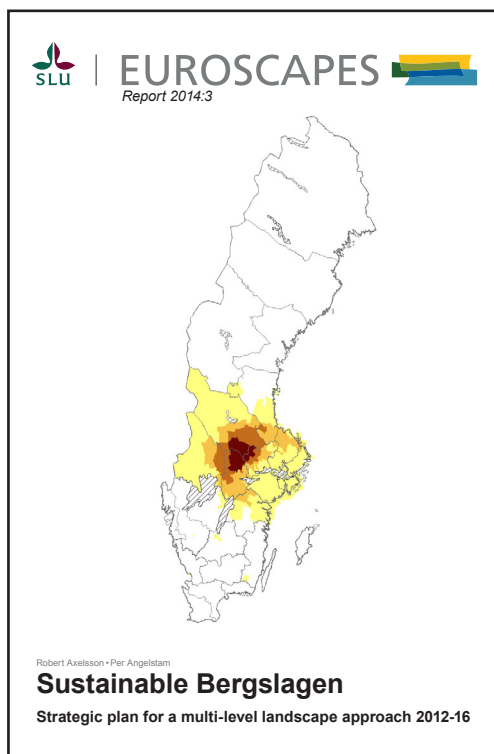


Figure 12. The vision of Sustainable Bergslagen for the region's landscapes has been divided into five goals (1-5) and four cross-cutting themes (A-D). Development of collaboration and learning is a continuous process.

Financing a landscape approach initiative

Applying a landscape approach by integrating place-based collaboration and learning among actors and stakeholders towards sustainability involves several challenges. Given that building trust and trustworthiness as key features of learning processes take time (Axelsson et al. 2013a), one of the challenges is to secure funding for a diversity of cross-cutting activities. Thus, in addition to considerable in-kind contributions from the stakeholders in the Sustainable Bergslagen initiative, several kinds of project funding is necessary.

Projects can be classified as networking, research, development or implementation, and be combined in different ways. Networking is about development of relations among people with the aim of mutual learning to support sustainable landscapes. Research can be seen as either academic and disciplinary, or problem-oriented. In the latter, often called transdisciplinary, integration among disciplines and cooperation among researchers and non-academic actors occurs. Development in this context is when actors and stakeholders learn to steer towards sustainability together. Implementation is the process of adopting new practices. Since the emergence in 2004 of the idea about a regional partnership towards sustainable landscapes in Bergslagen, a wide range of sources of funding have contributed (Table 1).

Table 1. To complement in-kind funding by Sustainable Bergslagen's partners, project funding for networking, research, development and implementation has been received from a wide range of organisations. (1) Baltic Forest, (2) Baltic Landscape, (3) Neighbourhood collaboration with Belarus and Ukraine, (4) Thematic partnership for spatial planning in the Baltic Sea Region, (5) Canadian-Swedish Model Forest exchange, (6) Swedish-Russian forest sector collaboration, (7) Integrated land-use planning for conservation and sustainable use of landscapes: toward international multi-sector and multi-level collaboration, (8) Connecting forests, people and markets in Europe's East and West, (9) Forest landscape planning, (10) Green infrastructures for ecological sustainability and human well-being, (11, 12, 13) Rural development, (14) Landscape approach development, (15) Quality assurance of conservation planning, (16) Bergskraft 11-13, (17, 18, 19), Stream restoration, (20) Learning and collaboration for river basin planning, (21) Stream restoration, collaboration for nature conservation and wind power, (22) Stream restoration and accessibility.

Type of work	Organisation	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Networking	EU InterReg (1,2)											
	Swedish Institute (3,4)											
	Canadian Forest Service (5)											
	SIDA via Forest Agency (6)											
	Swedish Ministry of Environ (7)											
Research	Wallenberg foundation (8)											
	FORMAS (9, 10)											
Development	Ludvika municipality (11)											
	Dalarna region (12)											
	EU Regional fund (13)											
	Sparbanksstiftelsen (14)											
	Sveaskog (15)											
	EU InterReg (16)											
	Mälarenergi (17)											
	Västmanland county (18)											
	Dalarna county (19)											
	WWF (20)											
Implementation	Lekeberg municipality (21)											
	Skinnskatteberg municip. (22)											

Sharing experiences and securing long-term funding

During recent decades many concepts have appeared, which aim at developing local and regional landscape approach initiatives by knowledge-based learning about sustainability and collaborative learning among stakeholders. The concepts Model Forest and LTSER platforms, as well as Biosphere Reserves, Ecomuseums, World Heritage sites as well as EU Leader now called Community-Led Local Development (CLLD) are six examples. It is both timely and important to share and learn from these experiences, examine what they deliver, and thus support further development.

To support knowledge-based learning about sustainability and collaboration among stakeholders requires that a new profession is developed – “landscape pilot”. The aim is to facilitate knowledge-based communication, trust and mutual learning. Long-term funding for teams of landscape pilots can facilitate both knowledge production about and towards sustainability, and strengthen collaboration both locally and regionally in a landscape approach initiative, among initiatives, and among landscape approach concepts.

Ultimately, any landscape approach concept, and place-based initiative that implements it on the ground, is successful only if it delivers a sustainable landscape.

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Bergslagen in south-central Sweden is an informal region with a long history of intensive land use. The legacies of more than 2000 years of integrated use of ore, forests and water of major national and international economic importance now involve several challenges for the maintenance of sustainable landscapes. This includes sustainability of rural and urban communities, of green infrastructures for natural capital and human well-being as well as of forests, river basins and mining. In response to this cross-sectoral integration is necessary at multiple levels of public, private and civil sectors, as well as academia and schools. Landscapes need thus to be viewed as integrated socio-ecological systems. Collaboration and continuous learning among actors and stakeholders are needed for sustainable use and management of landscapes' goods, services and values. To support this requires (1) data, monitoring and assessment of different aspects of sustainability, (2) continuous knowledge production about material and immaterial landscape values relevant for the management of ecological, economic, social and cultural dimensions, (3) information and communication using both traditional media, as well as (4) through art and culture. With the vision to contribute to satisfying these requirements the Sustainable Bergslagen initiative emerged gradually since 2004 as a multi-level partnership for sustainable landscapes (www.bergslagen.org). By joining the International Model Forest Network (IMFN), and the network for Long Term Socio-Economic and Ecological Research (LTSER), actors and stakeholders can learn from other regions' sustainable development processes, and make Bergslagen more visible internationally.

www.bergslagen.org



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