

Mistra Sport & Outdoors

Towards Sustainable Solutions

Program Plan 2020-2024
Part A

*Peter Fredman, Sverker Sörlin, Anders Larsson, Marie Stenseke, Mikael Bäckström,
Robert Pettersson, Dimitri Ioannides, Christina Frimodig, Sandra Wåger*



MISTRA Sport & Outdoors, Rapport 2020:1

Författare: Peter Fredman, Sverker Sörlin, Anders Larsson, Marie Stenseke, Mikael Bäckström,
Robert Pettersson, Dimitri Ioannides, Christina Frimodig, Sandra Wåger

Omslagsfoto: Hampus Fredman

ISBN: 978-91-88947-87-1

Content

Foreword	i
Highlights	i
Summary	ii
Sammanfattning	iii
Facts about Mistra Sport & Outdoors	iv
1. Loved by many, practiced by even more	1
...but with a serious sustainability deficit	1
Vision, aim and goals.....	2
Research directions	4
2. Mistra Sport & Outdoors – framing concepts and research review	5
Impact on the natural environment	6
System innovation and life cycle analyses.....	10
3. Co-creation towards sustainable sport and outdoor recreation	12
4. Structure and organization	19
5. Leadership and program integration	20
6. Communication	22
7. Impacts from research	24
8. Value for society	25
9. A network-based research center (Mistra Sport & Outdoors-net)	27
10. Work-packages	27
WP 1: Understanding use of knowledge in sport and outdoor recreation – Path dependencies and transformations	27
WP 2: Potentials for sustainable transport and mobility in outdoor recreation and sports-event planning	32
WP3: Sport and outdoor recreation through the lens of land and water use – Ecological effects and spatial planning options	35
WP 4: Sustainable sport and outdoor equipment – Smarter materials and material flows	40
WP 5: Event management in sport and outdoor recreation	46
WP 6: Towards sustainable development in the sport and outdoor recreation sectors – Behavior, policy and future change.....	50
References (selected)	55

Foreword

This plan for the Mistra Sport & Outdoors program covers activities for the period April 2020 to March 2024 (phase 1). It is developed based on an application written with an eight-year perspective, including also a second phase (2024-2028), for which funding will be applied for when phase 1 is evaluated. The plan consists of two parts: Part A, which is based on the application to Mistra and revised according to input from the review panel and the Mistra board. Part B, which is a more detailed “working document” (revised annually), includes a more comprehensive description of the organization and operating principles of the program, the co-creation process, deliverables and budget. This report includes part A of the plan. Part B is available by contacting the program director at: peter.fredman@miun.se.

Highlights

- **Mistra Sport & Outdoors** takes environmental impacts as a point of departure to study sustainable practices in sport and outdoor recreation.
- The **aim** is to produce and apply new knowledge on sustainable solutions which reduce negative impacts from transport, land and water use, equipment and events.
- The **goals** are to do research with a high potential to reach the international forefront, prepare a movement for sustainable practices and develop a plan for a network-based center for research, development and policy support in favor of sustainable solutions in sport and outdoor recreation.
- The research is organized in **six work packages** focusing on: 1) Knowledge, path dependencies and transformations; 2) Transport and mobility; 3) Land and water use; 4) Materials and equipment; 5) Events and spectators; and 6) Behavior, policy and future change.
- The program will use a **co-creation process** designed in dialogue with the Swedish Sports Confederation, the Swedish Association for Outdoor Organizations, the Swedish Environmental Protection Agency, the Swedish Society for Nature Conservation and the Scandinavian Outdoor Group.
- Our research supports inter- and transdisciplinary synergies in studies of sport and outdoor recreation and contributes to the **2030 Agenda for Sustainable Development**.

Summary

The growing sport and outdoor recreation sectors produce many positive societal benefits, but also generate undesirable environmental impacts. Functional specialization, increased mobility and new technologies drive many of the changes at present, while concurrently they offer opportunities for more sustainable practices not yet realized. The vision of *Mistra Sport & Outdoors* is to provide a role model in sport and outdoor recreation – on track towards a sustainable development, minimizing negative environmental effects through co-creation between research and practice, learning processes and mobilization. Research is organized in six integrated work-packages focusing on: (1) Knowledge, path dependencies and transformations; (2) Transport and mobility; (3) Land and water use; (4) Materials and equipment; (5) Events and spectators; and (6) Behavior, policy and future change. The program host Mid-Sweden University, together with six partner universities, will reach out and collaborate with relevant stakeholders in sport, outdoor recreation and environment/ sustainable development. The goals are to do research with a high potential to reach the international forefront, prepare a movement for sustainable practices and develop a plan for a network-based center for research, development and policy support in favor of sustainable solutions in sport and outdoor recreation. This program plan covers activities for the period April 2020 to March 2024, developed based on an eight-year perspective. It consists of two parts: Part A, which is based on the application to Mistra and revised according to input from the review panel and the Mistra board. Part B, which is a more detailed “working document” (revised annually), including a more comprehensive description of the organization and operating principles of the program, the co-creation process, deliverables and budget.

Sammanfattning

När idrotten och friluftslivet växer innebär det många positiva effekter på samhället, samtidigt som det också medför negativa konsekvenser på natur och miljö. Specialisering, ökad rörlighet och ny teknik driver på utvecklingen, men innebär samtidigt nya, och ännu orealiserade möjligheter för ett mer hållbart samhälle. Visionen för *Mistra Sport & Outdoors* är att skapa en förebild inom idrott och friluftsliv – i riktning för en hållbar utveckling och minimera negativa effekter på miljön, genom samverkan mellan forskning och praktik, lärandeprocesser och mobilisering. Forskningen är organiserad i sex integrerade teman (arbetspaket) som fokuserar på: (1) Kunskap, utvecklingsmönster och transformeringar; (2) Transporter och rörlighet; (3) Användning av land och vatten; (4) Material och utrustning; (5) Event och åskådare; samt (6) Beteende, policy och framtida förändringar. Programvärden, Mittuniversitetet, tillsammans med sex partneruniversitet, kommer nå ut och samarbeta med relevanta aktörer inom idrott, friluftsliv och miljö/ hållbar utveckling. Målen är att genomföra forskning med hög potential att nå en internationellt ledande position, förbereda en rörelse för hållbart utövande och utarbeta en plan för ett nätverksbaserat centrum för forskning, utveckling och policystöd kring hållbara lösningar inom idrott och friluftsliv. Denna programplan omfattar aktiviteter under perioden april 2020 till Mars 2024, framtagna baserat på ett åttaårigt perspektiv. Den består av två delar: Del A, som är baserat på ansökan till Mistra och reviderad efter inspel från utvärderargruppen och Mistras styrelse. Det B, som är ett mer detaljerat "arbetsdokument" (revideras årligen), omfattande en mer komplett beskrivning av programmets organisering och genomförande, samverkansprocessen, leveranser och budget.

Facts about Mistra Sport & Outdoors

Program host:

Mid-Sweden University

Partner institutions:

Chalmers University of Technology

Dalarna University

KTH Royal Institute of Technology

Malmö University

Stockholm University

University of Gothenburg

Program period:

April 1, 2020 – March 30, 2024

Funding:

Mistra 56 MSEK

Co-funding from partner universities and organizations: 14 MSEK

Program leader:

Professor Peter Fredman, Mid-Sweden University

Co-creation specialist and program co-leader:

Christina Frimodig, Mid-Sweden University

Work package leaders:

Professor Sverker Sörlin, KTH Royal Institute of Technology

Associate Professor Anders Larsson, University of Gothenburg

Professor Marie Stenseke, University of Gothenburg

Professor Mikael Bäckström, Mid Sweden University

Associate Professor Robert Pettersson, Mid-Sweden University

Professor Dimitri Ioannides, Mid-Sweden University

1. Loved by many, practiced by even more

A feature of contemporary, urbanized and industrialized societies is the growth of sport and outdoor recreation. Loved by many, practiced by even more, sport and outdoor recreation activities contribute significantly to society – they support public health and civic spirit and they offer entertainment on the highest possible level. Humans have always played and been physically active, but sports and outdoor recreation as we know them are modern phenomena. Today, the scale of sport and outdoor recreation has become enormous. The number of sports and games have multiplied and are counted in hundreds in the Olympic Games alone. Practitioners of sports are counted in the millions.

In Sweden, sport and recreation in the outdoors are very common activities in most age groups. According to the *Swedish Sports Confederation (RF)*, there are 3 250 000 members, of which 822 000 are leaders, in 19 300 sport clubs in Sweden. The umbrella organization for outdoor organizations in Sweden, *Svenskt Friluftsliv*, has 26 member organizations with 1.6 million members of whom 300 000 are children and youth. About 75 percent of the population aged 6-80 years report engaging in moderate-intensity physical activity (as defined by WHO 2018) at least 1 to 2 times a week. Being physically active in a sport club is most common among 10-12 years old, and soccer is the most popular game. We also note that 40 percent of the Swedes report that they rather or very often spend time in nature to recreate (Fredman et al. 2014). Most common activities are walking for pleasure and forest walk. At the same time, the sport and outdoor sectors shows many signs of flourishing economically, as consumer markets for apparel and equipment, and an event market for spectator tickets and tourism (Fredman et al., 2012; Getz and Page, 2016; Elmahdy et al., 2017).

...but with a serious sustainability deficit

While the benefits are obvious, sport and outdoor recreation also leave growing environmental footprints. To put it very succinctly – many sport and outdoor recreation activities are unsustainable, especially environmentally but also socially since some of these activities are not accessible to portions of the population. This causes social inequalities, troubling impacts and may even limit the “life chances” of many (Dahrendorf 1979). While there are interesting sustainability initiatives in several organizations, the overall sustainability performance of the sport and outdoor sectors is poor, and there has been a palpable indifference among many actors and practitioners to take sustainability and climate challenges seriously enough. There is also a lack of knowledge in society, and politics, on how to govern the increasingly multifaceted and globalized sport and outdoor sectors to a more

sustainable course. Challenges ahead are thought-provoking and sobering, especially in the light of current knowledge about the effects of climate change and the profound impacts of humans on the planetary scale.

The Mistra background paper (McCullough et al., 2018) highlights the significance of environmental impacts from sport and outdoor recreation, many of which are addressed in this proposal: *Consumption of natural resources, consumption of nonrenewable resources, production of equipment and clothing, damage to fragile ecosystems, emission of greenhouse gases, habitat and biodiversity loss, wildlife disturbance, loss of natural spaces and land use changes, noise pollution, water pollution, soil erosion, and waste.* The complexities of these impacts shall not be underestimated, and solutions call for collaboration across boundaries and between stakeholders. They also contrast sharply with the multiple positive impacts that also follow from sport and recreation in the outdoors. ***These are strong incentives for us as we respond to the Mistra call.*** There are many reasons to think constructively and hopefully about what can be achieved, and the Swedish context is particularly useful as a testbed for ideas and innovations in the years to come. ***In Sweden, sport and outdoor recreation are part of an active and resourceful civic society, with great potential to take a lead towards more sustainable practices.*** At the same time, it is in needs of reform backed up and informed by new knowledge based on in-depth and comprehensive research, capable to deal with wicked problems with multiple built-in goal conflicts (Jordan et al., 2018). While each sport and recreation activity need its own analysis under a designated process, there is for this research program a need for a term that can bring all these activities, diverse as they are, under a common umbrella. ***We will therefore speak of the sport and recreation in the outdoors as two joint broad spheres of activities, citizens, communities and organizations with comprehensive impacts on environment and society, and hereafter use the acronym SOD.***

Vision, aim and goals

In Mistra Sport & Outdoors we understand sport and outdoor recreation (SOD) as a fundamental element of the development of modern societies. Changes that SOD have brought are therefore comprehensive and deep, affecting anything from production systems and infrastructure to social interactions and personal habits, and the views of self, body, and relations that shape preferences, ideals, and lifestyles. It is also deeply linked to the formation of modern consumer markets, non-profit organizations, and to politics. The impacts of the mega-phenomenon that SOD represents in contemporary societies can therefore only be understood if it is seen as a central feature of this evolving modernity, and research can be a

powerful tool to disclose the path towards more sustainable practices. Hence, the vision for Mistra Sport & Outdoors is;

To provide a world leading role model in sport and outdoor recreation – on track towards sustainable development, minimizing negative environmental effects through co-creation between research and practice, learning processes and mobilization.

A central feature of the program is to work in close collaboration between research and stakeholders in the sport and outdoor recreation sectors through a co-creation process (further described below). Using such a model, we identify the following aim of Mistra Sport & Outdoors:

To produce and apply new knowledge on sustainable solutions which reduce negative impacts from transport, land and water use, equipment and events within sport and outdoor recreation.

Together with key sport and outdoor recreation organizations in Sweden, the Mistra Sport & Outdoors will achieve the following goals by the year 2024:

- Ongoing research in sustainable sports and outdoor recreation is of high quality and has a high potential to reach the international forefront, with high local relevance, in 2028.
- We have identified challenges, proposed solutions and communicated these together with the sport, outdoor and environmental sectors to prepare for a movement for more sustainable practices.
- We have developed a plan for a network-based center for research, development and policy support in favor of sustainable solutions in sport and outdoor recreation.

Achieving these goals will position the program to reach for the long-term goals by 2028 which implies (i) research at the international forefront implemented nationally and locally through co-creation between research and the SOD sectors, (ii) start of a movement for more sustainable practices based on experimentation, understanding and co-created solutions, and (iii) establish a network-based research center for research, development and policy support in favor of sustainable solutions in sport and outdoor recreation.

Research directions

Our research is organized in six work-packages nested in a co-creation model (further described below). This means that *researchers in Mistra Sport & Outdoors will work in several processes with SOD organizations to identify and elaborate research needs, case studies and activities through meetings and workshops around, but not limited to, the following research directions:*

Knowledge, path dependencies and transformations (WP1): What are the most fundamental path dependencies in Swedish SOD history that need to be broken to support sustainability? How have Sweden's main SOD actors related to knowledge during the long standing and comprehensive growth of SOD in society? What is the impact of growing sportification in outdoor recreation and (how) can it be turned around? How can teachers and students in physical education become carriers of reformed attitudes and practices in SOD?

Transport and mobility (WP2): How can participation in SOD activities be maintained in the context of increasing demand for environmentally sustainable mobility solutions? How can accessibility-based planning support this shift through the integration of different stakeholders? How can SOD help meet Swedish net zero emission goals from transport by 2045?

Land and water use (WP3): What are the major negative ecological effects related to SOD activities? What are the options on strategic as well as managerial level for minimizing the compound environmental effects of SOD, while at the same time enhancing outdoor activities that promote physical and mental health, nature experiences and social cohesion on an equal basis? How can new technologies and citizen science in planning and monitoring of sport and recreation activities contribute to the sustainability goals?

Materials and equipment (WP4): How can materials development and testing be transformed to support environmental sustainability in SOD clothes and equipment? How can new standards be developed that change producer behaviors and market conditions? How can LCA as an environment assessment tool be integrated in product development? How can production and production incentives be changed to align with an economy of drastically increased sharing and recycling?

Events and spectators (WP5): What are the implications of mobility and event related consumption in relation to SOD events? What are the opportunities and challenges to more sustainable solutions of SOD events from a management perspective?

Behavior, policy and future change (WP6): How can behaviors and practices, especially in light of the digital turn in society, shift to enhance sustainability in the SOD sector? How can an environmentally sustainable SOD sector nudge

members of the public to embrace sustainable living in all aspects of their life? How can we develop new products and programs but also new governance structures to enable the development and implementation of a comprehensive national policy framework for SOD?

Life Cycle Analyses (LCA) and system innovations can contribute with important perspectives to the various aspects of sports and recreation that are explored in WP1-WP6. In addition to linking LCA to material and product development in WP4, LCA will be integrated in one or more other WPs depending on the outcome from the co-creation process where potential areas of application and method development will be identified and prioritized within the research program.

2. Mistra Sport & Outdoors – framing concepts and research review

Mistra Sport & Outdoors will use the fairly wide official definition for *idrott*, that also encompasses the Swedish word *sport*: "*fysisk aktivitet som människor utför för att få motion och rekreation eller uppnå tävlingsresultat*" (SOU 1969:29; Blom & Lindroth 2002:12). We define outdoor recreation (*friluftsliv*) equally widely as: "*vistelse utomhus i natur- eller kulturlandskapet för välbefinnande och naturupplevelser utan krav på tävling*" (SFS 2003:133). Many contemporary changes and challenges in the SOD sectors today concerns different activities, places and equipment used. This means that besides its' traditional role for recreation, public health, quality of life, education and environmentalism there are challenges linked to sportification, a growing nature-based tourism, land-use conflicts and a multicultural society. Hence, there are strong indications of reinforced renegotiations of the *borderlands* between the traditions of: competition-oriented physical exercise (sport) in controlled environments (indoor) *vs.* nature encounters and experiences in uncontrolled environments (outdoor recreation and nature-based tourism). These new borderlands are of utmost importance with regards to location, motives, participants and equipment involved in SOD activities in the future.

Cultural forms of outdoor recreation vary considerably and were traditionally distinct from those of sport, just as practitioner sociology, age, and level of commercialization differed. These differences show a long-term trend to shrink and a *sportification* is ongoing whereby various *outdoor activities turn into sport activities*, with rules, games, teams, organized competitive events, and a spectator culture (Arnegård 2006). Typically, commercialization accompanies this

phenomenon. Sport has become part of the flourishing *event and entertainment industry*, with strong components of *digital and social media*. At the same time, SOD mix increasingly with *trends, fashion, and fitness* to shape what may be called sport and recreation *lifestyle clusters* with very strong implications for time use, the spending of money, and travel patterns all of which, in turn, have significant environmental and climate implications. Paradoxically, some of the identity of SOD, in particular recreational and outdoor sports, has formed around care for nature and support for the modern idea of ‘*the environment*’ (Warde et al 2018; Sandell & Sörlin 2008). We also note that *SOD has not been a major priority in Swedish research and innovation policies*. The Center for Sport Research (CIF) has a mere 18 MSEK in annual funding from the state. Outdoor recreation *per se* has no regular public research funding. Research conducted in Mistra Sport & Outdoors will therefore be geared towards a future knowledge provision and Mistra Sport & Outdoors will use its expertise and experience of work on research policy and advice to discuss and rethink public *funding priorities* considering the scale and environmental impact of SOD in contemporary societies.

Impact on the natural environment

In general, SOD is like any other large sector of modern societies in that it cannot be reformed or environmentally improved in isolation. *Successful transformation requires new relationships between societies and natural constraints*, taking into regard wider changes in the human-earth relationship represented by concepts such as planetary boundaries (Rockström et al 2009), climate change, biodiversity (IPCC and IPBES reports), and conditions of ‘*the Anthropocene*’ (Crutzen 2003). Human societies are experiencing a “shock” (Bonneuil & Fressoz 2016) associated with the planet’s rapidly deteriorating conditions (Wallace-Wells, 2019) warning about the need to act now and across all sectors of society. Attempts in recent decades aimed at achieving sustainable development have provided promising results on the *development* side (growth), but *environmental* and *social* sustainability are far from being achieved. Climate and biodiversity targets have not been met anywhere. Arguments and drivers over several decades have largely focused on markets and economic incentives.

In what follows, we will present a set of issues covered in previous and ongoing research, or not covered, leaving knowledge gaps. This will map out the background to the work-packages and provide a rationale for choices made. The presentation is not exhaustive and does not pre-empt specific research contexts provided in the WPs. Its intention is to serve as a *translational tool* between the general challenge inventory in the background report to Mistra (McCullough et al., 2018) and the research directions that Mistra Sport & Outdoors has taken. It thus also serves a

role in the important work of *stitching together* identified environmental and sustainability problems with research agendas, operation of work packages, collaboration with stakeholders, and further communication and dissemination through work with policy and the public.

Governance and system impact

The growth and diversification of sport and outdoor activities has significantly affected the natural landscape and built environment. This situation highlights the necessity to conduct a thorough analysis of *decision-making, power structures and governance* of the SOD sectors. Mistra Sport & Outdoors will review the current steering of the SOD sectors from an environmental and sustainability point of view. In Sweden such reviews have been done for other sectors such as transport (e.g. Climate Policy Council 2019). For SOD it has never been attempted, meaning that no one has considered how the system impact as a whole can be assessed, or how it can be improved. Resources within the sectors are not used enough and a sense of urgency in terms of the climate and the environment is lacking (Aall et al., 2011). An essential resource, that Mistra Sport & Outdoors will engage, are educators in schools and instructors and leaders of associations and clubs, and leaders also possess considerable empirical materials for comparative research. Leaders in SOD organizations are key influencers, as are of course the many Swedish sport and outdoor adventure stars.

Mobility

The fields of *transport and spatial planning* have traditionally been engaged with problems related to efficiency of flows based on infrastructure and car-based travel. In the light of increasing environmental and social challenges there is a shift towards questions of sustainability and the *broader concept of mobility* (Banister 2008). This has widened the scope of transport related issues to involve aspects such as health, inequality and energy consumption (Schwanen 2016). The dominating focus is centered on the urban context, and questions of planning for densification and the reduction of auto-based travel through the clustering of land-use activities that lend themselves to the use of public transport but also active modes of travel such as cycling (Newman and Kenworthy 2015, Cervero, Guerra et al. 2017). With the widening mobility concept there is a substantial growth in the use of the *accessibility concept* as a model to capture the interaction of land-use, transport and sustainable development (Bertolini, le Clerq et al. 2005). It has also stimulated to studies on the implementation of academic work in planning practice (Curtis and Scheurer 2010).

Materials

Companies that design and manufacture SOD clothing and equipment shall ensure their products perform, while at the same time negative impacts on the environment must be avoided. With new technologies and materials comes both opportunities and challenges in this respect. The need for performance has to be addressed throughout the design and production chain, while environmental issues unsolved concern mainly the replacement of toxic substances contaminating natural environments (Cai, 2012; Dauchy et al., 2012) used in SOD garment treatment and textile processing, as well as production of new products from recycled materials. Different *environmental assessment methods* have proven useful (Wrisberg et al., 2012), but applications to SOD is still under-researched. Environmental aspects and potential environmental impacts of a SOD equipment should address its entire life cycle: From raw material acquisition through production, use, end-of-life treatment, recycling and final disposal. Such Life Cycle Analyses (LCA) are a key approach to a more sustainable SOD sector with respect to equipment and materials and will be used to compare environment impacts among different SOD activities in Mistra Sport & Outdoors. Clothing and equipment in the SOD sectors are also subject to new forms of market exchange that largely come under the umbrella of *circular and sharing economies*. Martin (2016) identified six different discourses in the sharing economy: an economic opportunity; a more sustainable form of consumption; pathways to a decentralized, equitable and sustainable economy; creating unregulated marketplaces; reinforcing the neoliberal paradigm; and a field of innovation. Since the ecological benefits of sharing are obvious – secondary markets reduce demand for new goods, so footprints go down – it should have the potential to provide new pathways to sustainability (Heinrichs, 2013). However, despite the widespread belief that sharing helps reduce environmental impacts, there are almost no comprehensive studies on this topic within SOD. The same goes for *alignment between traditional consumer markets and an economy of increased sharing and recycling*.

Land and water – ecologies and infrastructures

Considerable land and water areas are used for SOD activities both in urban regions and in less populated areas. Recently, the Nordic countries have experienced a rapid growth in numbers of visitors to popular nature attractions, resulting in crowding, environmental damage, costly rescue operations and overloaded public infrastructures. Research on *ecological effects of SOD* has mainly focused on recreational activities in *wilderness and protected areas* (Hammit et al. 2015, Marion et al. 2016, Newsome et al 2012). There are a few studies of ecological effects and management concerning SOD in *marine environments* (Brake et al 2015). When it comes to urban areas, research on recreational space is an emerging field,

with less attention to impacts on species and ecosystems thus far, but more on societal effects, including health and equity (Aalto Erixon & Ernstson 2017, Hartig & Kahn 2016, Sallis et al. 2016). In addition, there is an increasing number of studies of *green infrastructure* (Lennon 2015). Overall, research on SOD related to land and water use shows that *ecological impacts* are dependent on the amount and intensity of use, visitor behavior and the character of the ecosystems at hand. It is essential to understand the underlying reasons for use in order to influence behavior. There is also a broad recognition that there are good options to minimize impacts (Hammitt et al., 2015), indicated by *managerial concepts* well known from the literature, such as Limits of Acceptable Change (USDA, 1997), Recreation Opportunity Spectrum (USDA, 1979) and Visitor Impact Management (Graefe et al., 1990). A review of *policy instruments* for sustainable recreation under public access regimes points towards a mix of different measures (economic, administrative, information) to successfully deal with the challenges involved (Øian et al., 2018).

Actors, organizations and events

Historically, the Swedish sport movement (*idrottsrörelsen*) has been relatively quick to implement new scientific knowledge in theory, while the practical implementation is much slower (Svensson et al., 2016). What is then the case with regards to sustainability? In their main program "*What Sport Wants*" The Swedish Sports Federation (RF) emphasized the responsibility that the sport movement has for the protection of the environment, including travel related to training and competitions (Riksidrottsförbundet 2009). Although RF's internal evaluation has been relatively extensive and critical (e.g., Faskunger & Sjöblom 2017, Redelius et al. 2016), the full impact of the sports movement on sustainability has yet to be examined. A few events in Sweden have been certified as environmentally sustainable (ARE2019 2017, Göteborg & Co 2013, RISE 2015) and a few national sport federations have constructed checklists for environmentally sustainable strategies (Orienteering 2014, Horse Riding 2017).

Targeted research on sport and environmental issues is limited and of the few existing studies, most focus on the *effects from major events and competitions*, both internationally (Collins et al. 2012, Dolf & Teehan 2014) and in Sweden (Andersson et al. 2016). A common conclusion of these is that travel, transport and accommodation in connection to major *sporting events have a negative impact*. Wheeler and Nauright (2006) found that the negative effects of the increasing popularity of golf, in terms of the severe impact on nature and wildlife following the construction of new golf courses, have been given little attention within the golfing community. Casper et al. (2012) emphasize the fact that although many sport organizations care for the environment, they take little action to promote

environmental work, and similar behaviors are observed for outdoor recreation organizations (Wolf-Watz, 2014). The *Swedish studies* on sport-related sustainable development *primarily deal with the social dimension* and focus on the identification of promoting principles for long-lasting and healthy practice of sport or sport leadership (Annerstedt & Lindgren 2014, Grahn 2014, Pettersson & Pipping Ekström 2014, Barker et al. 2014). It is, however, pointed out that sport organizations have great opportunities to work with sustainability and environmental issues by way of their social platform in society (McCullough et al., 2016), and the authors argue that these organizations should implement environmental perspectives to become part of their organizational practice if they want to remain legitimate.

System innovation and life cycle analyses

In order to nudge the comprehensive sport and outdoor recreation sectors in a more sustainable direction, a system innovation approach is needed. This implies a horizontal approach that combine technologies and social innovations to deal with system-wide challenges. Such perspectives are grounded early in the program (WP1) through several theoretical framing perspectives: Uses of knowledge in organizations and the role of path dependency (David, 1985; North, 1990; Pierson, 2000), directional transformations (Scoones et al., 2015; Schot, 2016;) and recontextualization of pedagogic discourses (Bernstein 1990 and 2000). System innovation implies that system-wide changes are necessary to make economies socially, economically and environmentally sustainable. This calls for a shift in governance structures that not only allows change to occur, but also directs and orchestrates the changes. Hence, in the latter part of the program (WP6) the underlying foundation is to link the past and present with the future through applications of environmental policy theories (Baumol and Oates, 1988), assessments of existing governance structures (e.g. Goodyear et al. 2014; Patton 2008) and outlooks for new and improved approaches to govern the SOD sectors.

A key approach in system innovation is to conduct life cycle-based systems level analysis, especially at the early stages of technology development (Bergerson et al, 2019). Within the disciplinary of environmental science, there are several frameworks and assessment tools available (Wrisberg et al., 2012), for example Integrated Environmental Assessment (IEA), Environmental Impact Assessment (EIA), Ecological Risk Assessments (ERA), Material Flow Analysis (MFA), Cost-Benefit Analysis (CBA), and Life Cycle assessment (LCA). Among these tools, LCA is best suited for comparison of potential environment impacts of different alternative to fulfil a specific function. The function could be a product (e.g., SOD equipment/accessories), services (e.g., SOD events), and activities (e.g. outdoor

sports). LCA addresses the environmental aspects and potential environmental impacts throughout a product's life cycle from raw material acquisition through production, use, end-of-life treatment, recycling and final disposal (ISO, 2006). Since the early development of LCA in the 1980-90s, when it was mostly used for assessment of products, it is now widely used by researchers, but also by industry, organizations, and policy makers as part of their environmental decision-making process. It can be applied to many aspects of society, such as industry processes, food products, energy systems, buildings and facilities (Jacquemin et al., 2012; Roy et al., 2009; Bhat and Prakash, 2009; Cabeza et al., 2014) many of which are highly relevant to SOD. The results of a LCA can be presented as different environment impacts categories, e.g. impacts on climate change, land-system change, biochemical processes, biodiversity, energy resources toxicity and/or water use, depending on the goal of the study.

Application of LCA for decision making in industry and by public authorities has increased steadily over the last years. Some sectors/areas with early development in this field were waste management planning and product development in the vehicle industry. Rapid development is now ongoing in the infrastructure and building sectors, with life cycle perspective being integrated in building certification systems, e.g. (SGBC, 2018) and infrastructure procurement by the Swedish Transport Administration (Trafikverket, 2018). There is also growing interest in methods for application of LCA in early design of new technology (Arvidsson et al., 2018). To date however, few LCA studies have been published within the sports and outdoor recreation sector. This indicates that the life cycle perspective, with its view of responsibility for both direct and indirect environmental impact of products and activities, has not yet gained much attention in this sector. Statistics Sweden recently made a first attempt at quantifying the direct and indirect climate gas emissions from the tourism sector in Sweden (SCB, 2018). Based on national economic accounts and the environmental accounting system, results show that climate gas emissions from tourism in Sweden represent 7% of total emissions. A handful studies have used LCA to assess life cycle impacts of individual events (Dolf and Teehan, 2015), sports infrastructure (Hedayati et al., 2014), local tourism activities, e.g. (Kuo et al. 2012), or use of new materials in sports equipment (Subic et al., 2010). These studies show the importance and potential of applying a life cycle perspective to sports and recreation.

3. Co-creation towards sustainable sport and outdoor recreation

It follows from the sections above that the environmental impacts of SOD are (likely) considerable; that comprehensive change is needed in activities across the SOD sector; that the use of knowledge to perform on environmental sustainability has had a low priority; and perhaps most importantly that there is an enormous potential in collaboration between SOD and its actors on the one hand and the research community on the other. *We have taken this conclusion as a point of departure when building the methodological approach for Mistra Sport & Outdoors as a comprehensive, integrative research program.*

This implies a *co-creation process* between research and practitioners. Previous experience and research as well as consultations with stakeholders and experts in the SOD sectors all show that complex societal challenges, like the transformation to a more sustainable society, require approaches that include close collaboration in order to achieve long-lasting changes. *In dialogues with key organizations in the sport and outdoor recreation sector at the national level¹ and experts on learning for sustainable development² we have developed a model for co-creation to identify and implement solutions for sustainable sport and outdoor recreation.* This model implies a process where researchers and stakeholders work closely together through different steps, with the long-term aim of establishing a movement of larger number of actors working towards more sustainable sport and outdoor recreation in Sweden, and beyond. It also serves as *an ongoing cohesive enterprise*, bringing the fairly extensive program, with broad interdisciplinary collaborations and multiple partners in several geographies, together under a common approach and with multiple connecting points – taking stock, assessing, hammering out a common agenda, to ascertain that the program stays relevant and on track in relation to both the research and external partners.

The model outlining the co-creation process is based on theories about learning, governance, planning and innovation. At the heart of the model lies the assumption that the complexities inherent in the field of sustainable development in relation to sports and outdoor recreation require co-creation and collaboration between research and practice. In this sense, the model adheres to literature on

¹ The Swedish Sports Confederation, The Swedish Association for Outdoor Organisations, The Swedish Environmental Protection Agency, The Swedish Society for Nature Conservation and The Scandinavian Outdoor Group (apparel and equipment)

² Swedish International Centre of Education for Sustainable Development (SWEDES) at Uppsala University.

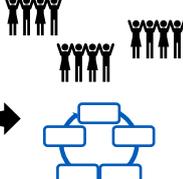
“wicked problems” (Westin et al. 2016; Rittel & Webber, 1973; Ritchey, 2011, Ison, 2010). This literature shows that transformation of wicked situations cannot be singlehanded by policy instruments such as legislation, implementation of new technology or economic incentives, and that governance responsibility cannot be reduced to one organization or one discipline. Instead, effective and efficient governance is the result of dynamic interactions and co-creation between different organizations, involving academia as well as civil society and authorities (Steyaert & Jiggins, 2007). Such co-creation involving a multitude of perspectives is also emphasized in research as an enabler of “divergent thinking”, which is considered a prerequisite for both social and technical innovation (e.g. Lindberg, 2018; Bennett & McWhorther, 2019).

Research has illuminated challenges involved in getting co-creation off the ground, including differing understanding, interests and mandates among involved organizations (e.g. Duit, et al., 2009; Scott & Gough, 2003; SLIM, 2004). Learning theory provides important insights on how these challenges can be handled that will be applied on our model for co-creation. These include the use of context-sensitive iterations of strategic planning, experimentative action, observation and reflection. Such iterative co-creation aligns with research on reflexive governance (Voss et al., 2006) as well as with action learning theory (e.g. Kolb, 1984), transformative learning theory (Moore, 2005) and inquiry-based learning (e.g. Torbert, 2004). Another crucial factor for successful co-creation and social innovation, which is often overlooked in both research and policy, is facilitation competence (Moore, 2012, Johnsson, 2018). In Mistra Sport & Outdoors, significant resources are allocated to provide the learning teams with purposeful facilitation that includes thought-through process design. Facilitation is necessary to constructively handle several challenges that are highlighted in critique of multi-stakeholder governance and co-creation, including challenges relating to power structures and conflicts, the need to go from open-ended co-creation and experimentation to legitimate decision making, and the need to ensure accountability while creating shared ownership among stakeholders. *It is also important to pay attention to the inherent dynamics between the explorative character of co-creation and the frame set by researchers’ competences and the studies proposed in the work-packages.* The latter two provide an important input to the co-creation process but will also put limitations to the process in the short run. As research continues into later processes, and eventually a second program phase, adjustments to the frame is quite likely. Resources at the disposal for the program board (8% of the total budget) can also be used to customize the co-creation process further.

Table 1 provides an overview of the co-creation process. During the first four years of the program (*Phase 1*) researchers and stakeholders work together to; (i) Identify

challenges, (ii) Plan the work, (iii) Develop knowledge and understanding, (iv) Develop solutions/innovations, (v) Test and evaluate the solutions/innovations, (vi) Develop concepts based on the solution and start the implementation, and (vii) Communicate with the aim to start a movement. During the next four years (*Phase 2*) we plan to continue to work to find solutions/innovations to challenges and the movement towards sustainability grows at a larger scale. New organizations are implementing the solutions/innovations through an iterative way of working.

Table 1. The co-creation process

	Phase 1 (year 1-4)			Phase 2 (year 5-8)
	<u>Step 1</u> <i>Identify challenges</i>	<u>Step 2</u> <i>Develop knowledge and solutions/innovations</i>	<u>Step 3</u> <i>Communicate and start a movement</i>	<u>Step 4</u> <i>Implementation at larger scale</i>
Co-creator group* (organizations and authorities in sport, outdoor, environment and academia at the national level) and learning teams:				
Activities:	Identify challenges	Plan Study Innovate Test/evaluate Concept/implement	Communicate the concept Seeking actors for mobilization	Develop solutions and a mobilization. Movement towards sustainability
Benefit for society:	Identified challenges for more sustainable sport and outdoor recreation	Increased knowledge about and solutions to the identified challenges	Increased understanding among the sport and outdoor recreation actors	A more sustainable way of working is developed within the SOD sectors

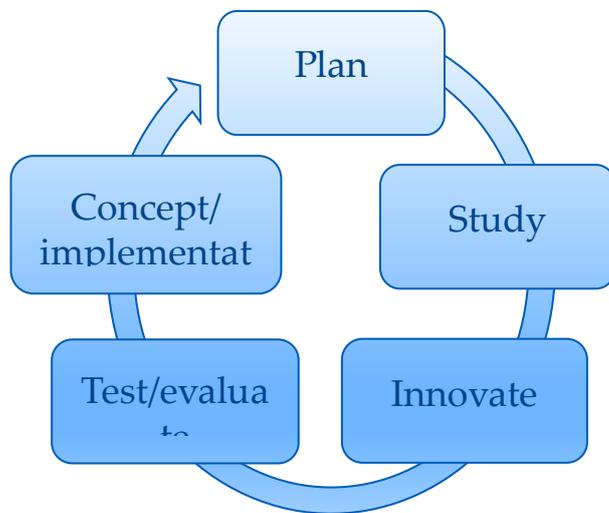
* Participation confirmed by The Swedish Sports Confederation, The Swedish Association for Outdoor Organizations, The Swedish Environmental Protection Agency, The Swedish Society for Nature Conservation and The Scandinavian Outdoor Group (clothing and equipment).

Step 1: Identify challenges

A co-creation-group consisting of representatives from the abovementioned key organizations at the national level, one researcher from each work package and one researcher representing a system perspective (LCA) jointly identify the most important challenges for a sustainable sport and outdoor recreation. Based on these challenges, learning-teams are created with the task to develop knowledge, understanding and solutions/innovations to the identified challenges. At least six learning-teams are created during the first year, and more can be formed following a re-evaluation every second year. The point of departure for identifying the challenges are in turn: *The National Swedish Environmental Quality Objectives; the 2030 Agenda for Sustainable Development; existing sustainability work in the SOD organizations and; the research needs identified in the WP description of Mistra Sport & Outdoors*. Challenges should be identified at different societal levels to best contribute to a role model for sustainable sport and outdoor recreation. We expect several of the challenges to be within the frame of the WP descriptions provided in this application, but given the inherent dynamics of the co-creation process, additional challenges are also expected to emerge. The program will have the flexibility to adjust the research accordingly. Output: *The co-creation-group has identified the most critical challenges*

Step 2: Develop knowledge and solutions/innovations

The learning-teams work with five steps to develop knowledge, understanding and solutions/innovations as shown in Figure 1. Facilitators, who are expert in co-creation processes and innovation, are supporting the learning-teams. This includes a main facilitator (employed in the program) and supporting expertise from the Swedish International Centre of Education for Sustainable Development (SWEDESD), as well as the Division of Research and Educational Support (which includes the innovation office) at Mid-Sweden University (program host) and equivalent departments at the partner universities.



Plan – Starts with the identified challenge and learning-teams work with understanding of the challenge, mandate/power, how the team will work together, which research activities are needed and how the stakeholders feed back to their organizations. Output: Confidence and trust in the teams, common understanding of the challenges and the work forward.

Figure 1. Five steps to develop knowledge, common understanding and solutions.

Study – The learning-teams develop knowledge and understanding of the challenges. Output: Research-based knowledge is collected, studies conducted and results presented. The practitioners contribute with experience-based knowledge and perspectives. Common knowledge and understanding are developed

Innovate –The teams are working in a creative, innovative process (design thinking) to find solutions to the challenges with a focus on the target. Output: The different learning-teams have developed and chosen one solution each to test.

Test/evaluate – The organizations test the chosen solutions, closely followed by a researcher. The evaluation is a combination of predetermined indicators and methods based on reflections from the participants to catch unexpected results and side-effects. Output: Tested and evaluated solutions by organizations and researchers.

Concept/implementation – The learning-teams are producing a concept to make the solution clear both for those involved in the learning-team and those that are not. The solution/concept is implemented in the organizations involved and spread to those that are not. Output: A concept with a clear solution, implemented and spread to additional organizations.

Step 3: Communicate and start a movement

The concept is communicated within the many different SOD organizations at national, regional and local levels, including also organizations that have not been involved in the learning-teams. Communication is also directed to the general public interested in sports and outdoor recreation. Researchers and other participants from the learning-teams contribute at national arenas and conferences where the SOD organizations meet (e.g. Riksidrottsmötet and Tankesmedja för friluftsliv). The learning-teams are seeking stakeholders interested in implementing the solution in their own organizations. In order to start a *movement for sustainability* we will facilitate and stimulate the will from the stakeholders and the general public interested in sport and outdoor recreation. We will work parallel with the general public to increase understanding and interest in sustainability and jointly with many organizations on local, regional and national level to use solutions/innovations for sustainability developed in the co-creation process. The movement is based on common understanding, co-creation, increased knowledge and upscaling of research findings. Organizations on local, regional and national level and the general public interested in sport and outdoors take part in the movement and work towards sustainability. The knowledge and solutions from Mistra Sport & Outdoors is one of the engines. The interest, knowledge and will from stakeholders and the general public is another. Together there is a potential to scale up the sustainability work. We will start two working-groups with researchers and partners to develop how to best start a movement for sustainability in sport and outdoors and develop a network-based center for sustainable solutions. This will be a collaborative process on how to work towards two of the goals of Mistra Sport & Outdoors. Output: *A movement towards sustainability is started.*

Step 4: Implementing at larger scale

With respect to the co-creation process, the second phase of Mistra Sport & Outdoors implies that new challenges are identified, and drawing from the experiences from Phase 1, more learning-teams will be established. Some of the solutions/innovations already produced during the first phase will be brought forward during year 5-8 to co-create mobilization at a larger scale via the many SOD organizations in Sweden. We also expect the organizations to go through the same process as the earlier learning-teams, but faster. The idea is to adapt the solutions to their own organizations and challenges rather than working from scratch.

How do researchers and partners work with the co-creation process in practice?

Significant for the co-creation process is a close collaboration between researchers and stakeholders under supervision from professional staff. For Mistra Sport & Outdoors this implies;

- Jointly identify challenges – background work and facilitated workshops
- Collaborate to develop knowledge and solutions/innovations to the challenges in six learning groups – facilitated workshops, planning, studies, presentations, innovate, test, evaluate and develop concepts
- Collaborate in two facilitated working-groups to start a movement and a network-based center for sustainable development in sport and outdoors.
- Communicate about the results and solutions
- Contribute with knowledge and experiences

For more information about the different steps in the co-creation process, please see part B of the program plan, the co-creation plan and the communication plan.

Collaboration with SOD organizations, education programs and innovation offices

A key feature of the co-creation model described above is close collaborations between researchers and organizations in the SOD sectors. While the design of the model is a result of discussions with the major “umbrella-organizations” in the sport and outdoor sectors at a national level, there are several additional organizations at the national, regional and local levels which have expressed their intent to collaborate with the program through cash or in kind contribution. These include: *En Svenskt Klassiker*, *Fjällmaraton*, *Friluftsförbundet*, *Göteborgs stad*, *Länsstyrelsen i Västra Götaland*, *Outdoormap AB*, *Svenska Fotbollsförbundet*, *Svenska kanotförbundet*, *Svenska Orienteringsförbundet*, *Svenska Parasportförbundet*, *Svenska skidförbundet*, *Svenska turistföreningen*, *Sveriges Akademiska Idrottsförbund*, *Västkuststiftelsen*, *Västra Götalandsregionen/Hållbart resande i väst* and *Fritidsbanken* (second hand SOD equipment). In addition to the abovementioned organizations, *physical education and health (PEH)* in schools and universities in Sweden are also contexts in which knowledge of, and ways of working for, sustainable development will be investigated and developed through the co-creation process. PEH is of particular importance since students will, just as teachers, become carriers of new knowledge and reformed attitudes and practices, both in relations to their students in turn and horizontally with their professions and engagement

in firms and SOD organizations. Finally, the *innovation offices* at the universities have extensive experience in utilization of research such as social innovation. They can support the co-creation process with methods for workshops and how to test, visualize and package new ideas and solutions. The innovation offices can also contribute with knowledge about how to launch start-up companies if that is a way forward for some of the solutions. Several of the 23 partner organizations to Mistra Sport & Outdoors also have their own innovation offices or similar functions, which we plan to cooperate with through a network to find the resources and expertise that fit the need of the different work packages and solutions. We also hope to create a common learning process among the universities and the partners about how to work together with challenge-driven, co-created innovations. Together with science parks, the innovation offices constitute a fruitful environment for further development of ideas, such as the *Peak Region Science Park* which focus on sports, outdoor and tourism, located at the Mid-Sweden University campus.

4. Structure and organization

To meet the demands of research that deals with complex problems and multifaceted settings, we have structured Mistra Sport & Outdoors in six integrated work-packages (WP1-6), each under the leadership of senior researchers. Program management and communication is designed to facilitate research, outreach and co-creation in the most efficient way, based on our experiences from previous large research ventures.

As illustrated with Figure 2, all WPs will follow the co-creation process, but with different perspectives. While WP1 will cover the broader societal perspectives of sport and outdoor recreation in relation to the abovementioned topics, WP2-5 are thematically focused on specific challenges, which are then brought forward in WP6 to address behavior and policy for sustainability in a more generic way. This WP will also more specifically target the second phase of the program. The more detailed WP descriptions below describe how the different WPs are related to each other as well as the co-creation approach.

In order to operationalize our research, especially in WP 2-5, we will target a selection of well-established sport and outdoor recreation activities. Besides environmental and social impact, selection criteria will be that they are performed by significant groups in society, cover different outdoor seasons (winter, summer) and represent different localities (mountains, coast, urban). The selection of activities will be decided as part of the co-creation process.

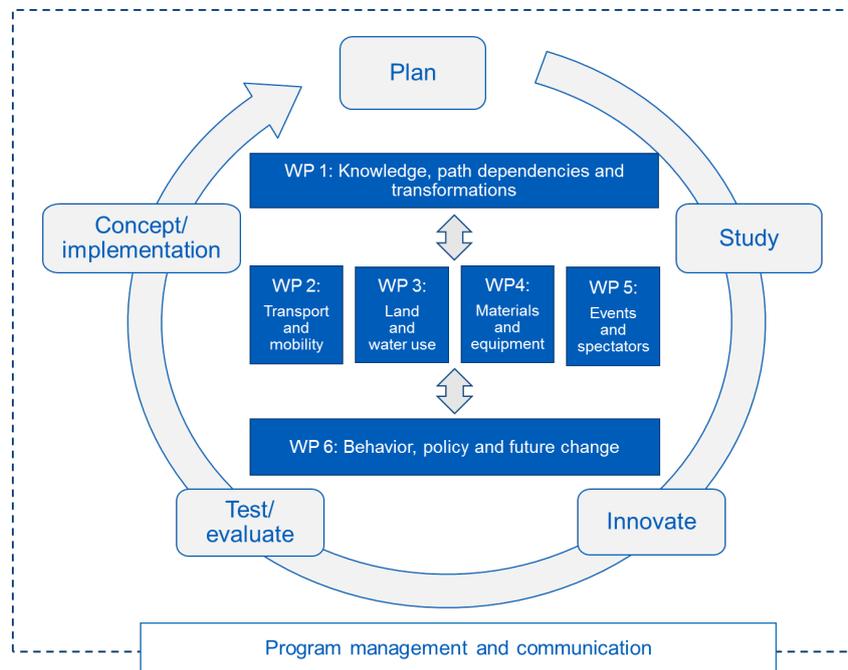


Figure 2. Program structure and organization

Program management and communication will be well integrated with all six WPs throughout the program periods. The program director will report to the program board, organize joint program meetings and activities and participate in research activities focusing on syntheses across WPs. The co-creation specialist will lead the co-creation and work closely together with the SOD organizations and researchers. SWEDESD will support the process with knowledge and experience. The communication specialist is responsible for the implementation of the communication plan (see below). This function will be in close collaboration with the program director, co-creation specialist and WP leaders, together forming an executive group for the entire program. Before the program starts, a consortium agreement will be signed between the beneficiaries to regulate the governance structure of the consortium, IP related matters, financial provisions etc.

5. Leadership and program integration

Mistra Sport & Outdoors has a high ambition with regard to leadership and integration. The program director, Professor Peter Fredman, has previous

experience as leader of several large research programs in Sweden and Norway and the co-creation specialist, Christina Frimodig, has worked more than ten years with communication and co-creation at the Swedish Environmental Protection Agency. We will emphasize integration both internally, among researchers in different WP, and externally with the program partners and other stakeholders. A strong focus will be on integration in several aspects across work packages, disciplines, competences, partner universities and individual researchers' competence through the co-creation process. Additional measures for integration involve several structured activities, where the program director, co-creation specialist and WP leaders play key roles:

Executive group. The program director, communication officer/co-director and WP-leaders will form an executive group that meets approximately every second month. This group will monitor progress in research, co-creation, and communication activities, as well as collaboration between WP and give advice on strategic issues controlled by the program director and board.

Program meetings. Two annual program meetings will be organized (one physical and one on-line), to promote cross-disciplinary integration and the co-creation process. These meetings will have a progression over time, focusing on e.g. co-creation, data collection, joint publications, communication and Phase 2. All researchers will be educated in the co-creation model. Study visits to locations of special interest for the program can be organized in cooperation with our partner organizations.

Visiting researcher program. Mistra Sport & Outdoors will support visiting researchers, shorter "research stays" and on-line meetings to facilitate international collaboration and internal integration. This involves funding for international researchers to take part in Mistra Sport & Outdoors related activities, give seminars, lecture at PhD courses etc. It will also allow for Mistra Sport & Outdoors researchers, especially young researchers (postdocs) and PhD students, to undertake visits at partner universities in the program.

PhD education. The Mistra Sport & Outdoors program will work actively to support PhD educations in the sport and outdoor recreation fields. There will be 6-8 PhD students active in the program affiliated with different partner universities. Mistra Sport & Outdoors will support seminars, workshops, conferences, PhD courses and/or teaching materials.

Focus on selected SOD activities and locations. A number of selected activities, locations and stakeholders will be studied in order to provide common grounds for researchers in the program. These cases will function as empirical "nodes" for integration and knowledge transfer. They will be decided as part of the co-creation process early in the program.

Interdisciplinary publications and outreach. The program will prioritize joint interdisciplinary publications both within each WP and between researchers from different WP. Of special interest is the ambition to crystallize findings at the end of the first four-year period into popular forms to target larger groups in society – making a difference on purpose. Through this approach, we formulate recommendations for a broader audience, which can be elements in implementation efforts during the second phase of the program.

Co-operation with other Mistra programs. There are several other Mistra programs that cover topics of relevance for Mistra Sport & Outdoors (see part B of the program plan). Contacts will be taken to explore possibilities for research, or other types of collaboration.

6. Communication

The point of departure for our communication approach is the understanding that the sport and outdoor recreation probably contribute significantly to environmental impairment (Arnberg, 2016). Some of the challenges and opportunities the communication of this research program needs to address are (i) a lack of knowledge of environmental impact; (ii) many actors and participants, and (iii) a major potential for reducing environmental impact through new and innovative ways of working. The aim of the communication is to:

- Increase knowledge and understanding among the target groups of the impact of sport and outdoor recreation on the environment and of the solutions available.
- Co-create solutions/innovations to the challenges in sustainable sports and outdoor recreation.
- In cooperation with the stakeholders contribute to a movement towards sustainable sports and outdoor recreation

The communication strategy is based on work with digital communication that is easily comprehensible and useful for the stakeholders. It involves co-creation processes between the stakeholders and the researchers. It will also facilitate and stimulate interest from the general public and the stakeholders for sustainability – ultimately contributing to a new movement for sustainability in sport and outdoor recreation. We have therefore identified the following main target groups for communication activities in the program:

- Non-profit organizations in sport, outdoor recreation and the green movement
- Commercial companies in the field of outdoor clothing and sportswear and allied equipment, as well as nature-based tourism
- Municipalities and county councils
- Government agencies and departments
- The general public interested in sports and outdoor recreation
- The research community

Internal communication

Internal communication is the basis on which external communication can function. In an interdisciplinary program with a complex issue such as this, it is essential to institute mutual planning and mutual learning. This includes among other things:

- Program meetings – workshops for mutual planning and learning
- Planning of communication initiatives with each WP
- Monthly information bulletins from the management – simple films or information e-mails.
- Common platform on the web with basic information (e.g. graphic profile, templates, monthly bulletins, planning documents).

External communication

The communication to external stakeholders is based on four complementary approaches;

1. Information. The basic information provided in the research program consists of a web site with blog, an active PR activity, information graphics and films showing the results of research and solutions/innovations aimed at a popular audience, an annual report, and a graphic profile. A lot of effort is put into create useful concepts to the solutions that the different learning-teams are developing. We cooperate with the key organizations who will disperse information and knowledge in their organizations. This is in order to achieve participatory involvement in communicating research results and solutions to a wider audience.

2. Dialogue. In order to succeed in our communication objectives, we will work together with the stakeholders and initiate a dialogue via blogs, social media, and web broadcasts with chat to communicate the results of the research and co-creation of solutions/innovations. We will contribute to the debate about sport, outdoor recreation and environment by participate in forum for sustainability and for sport and outdoor recreation. This will culminate in major conferences in years 4 and 8.

3. Co-creation. See description of the co-creation process above.

4. Mobilization. See description about implementing a movement above.

The communication work is evaluated yearly through interviews and/or surveys directed to internal and external stakeholders.

7. Impacts from research

Mistra Sport & Outdoors will address fundamental topics including environmental impacts from SOD (direct and indirect environmental effects; past, current and future impacts; low impact alternatives), promotion of more environmentally friendly SOD activities (motivation, behavior and practices; decision-making processes; more sustainable options), and governance of more sustainable SOD sectors (conflicts of interest; policies, tools and management solutions; physical planning; innovative approaches toward sustainability goals). Impacts from our research will be visible both within and beyond SOD, reaching out to other parts of society. At the *program-level and with an eight-year perspective*, we expect that; (i) SOD actors will have dramatically improved knowledge and common understanding about sustainability, (ii) SOD actors have recognized and acted forcefully on challenges for sustainability and put effective solutions into use, (iii) the negative environmental effects from the SOD sectors are reduced, (iv) a movement for sustainable sport and outdoor recreation is started, and (v) SOD actors work with other sectors and sustainable approaches are translated to other parts of society and vice versa.

While each work package description elaborates expected results in more detail, impacts will also depend upon outcomes from the co-creation processes. Keeping that in mind, *we do expect the following impacts based on the results from our research during the first program period (2020-2024):*

- A deeper and more nuanced understanding of the organizational cultures where relevant knowledge is actively integrated, and to initiate a process of entering sustainability and transformation into the core mission and everyday practices of the SOD organizations.

- Knowledge of how teachers and students in physical education and health become carriers of reformed attitudes and practices based on their professions and engagement in SOD organizations.
- A better understanding of the role of transport in SOD activities is reinforced by new geodata-based tools that support public planning through interactive processes. It will provide an inventive new knowledge-based platform for the creation of less carbon intensive and socially inclusive mobility solutions.
- The establishment of planning strategies at municipal and regional levels that minimize place-specific ecological effects, while enhancing SOD activities, including models for new blue-green infrastructures and new technologies for improved planning and monitoring strategies.
- In cooperation with the leading manufacturers of SOD equipment we expect to reduce the use of toxic chemicals and identify more environmentally friendly materials. More efficient use of materials through life cycle analyses, recycling processes and sharing behavior among consumers.
- Studies of consumer behavior among spectators and participants at events will provide new insights about consumption patterns and their implications for sustainability. Through co-creation with SOD event organizers, opportunities, challenges and attendees' behavior will be matched to propose strategies to increase sustainability during and outside the events.
- System innovation in sport and outdoor recreation through uses of knowledge in organizations, analyses of path dependency, directional transformations, re-contextualization of pedagogic discourses and a shift in environmental policy and governance structures.
- Life cycle assessments of key products and/or services within the SOD sectors to support a system innovation perspective (e.g. climate change, land-system change, biochemical processes, biodiversity, energy resources toxicity, water use) and contribute to solutions for more sustainable practices.

8. Value for society

While the point of departure for Mistra Sport & Outdoors is to reduce the negative environmental impacts, additional aspects of sustainability are addressed to support a system perspective according to the *2030 Agenda for Sustainable*

Development. The program will result in interdisciplinary synergies between sport and outdoor recreation, co-creation between research and practice to find and implement solutions to identified challenges and robust interventions to solve strategic environmental problems. Existing and new research will be translated into practical applications and the program shall take an active role in social debates. *Ultimately, the program will by 2028 establish a movement for sustainable development through co-creation between research and practice.* We acknowledge that the 17 global goals are integrated and indivisible. While specifically addressing transportation and mobility aspects of SOD related to SDG 13 on combatting climate change, ecological issues related to SDG 14 and 15 on conservation and sustainable use of marine and terrestrial areas, and materials and equipment used in SOD related to SDG 12 on sustainable consumption and production, we are attentive to other global goals of relevance for SOD as well. In particular, SDG 3 on health, SDG 5 on gender equality, SDG 10 on reducing inequality and *SDG 11* on cities and human settlements, including inclusive and accessible, green and public spaces. *At a more principal level, the benefits to society from Mistra Sport & Outdoors includes:*

- Identified challenges for more sustainable sport and outdoor recreation
- Increased knowledge about solutions to identified challenges
- Products, measures and policies that contribute to a more sustainable way of working and participating in the SOD sectors

We address relevant environmental impacts in all our WPs, and through the actions taken for program integration described below we will safeguard a system approach to our inquiries. We cover sport and outdoor recreation in urban as well as rural areas. Through co-creation and communication strategies our research will reach out to relevant stakeholders and the program will take an active role in contemporary discussions regarding a more sustainable development of the SOD sectors in Sweden. Successful results are likely to be transferred to the neighboring Nordic countries where the structure of SOD is quite similar already in phase 1. A European initiative will then be a natural second step to take in phase 2 of the program. Scientifically, Mistra Sport & Outdoors relates to both the integrative approaches across work packages as well as disciplinary synergies between SOD study fields and traditions. Researchers involved have strong records in both the sport and outdoor recreation (friluftsliv) study areas, providing excellent opportunities for synergies and more integrated studies which will contribute to further develop these two fields scientifically.

9. A network-based research center (Mistra Sport & Outdoors-net)

One of the long-term goals of Mistra Sport & Outdoors is to establish a network-based research center on sustainable solutions for sport and outdoor recreation – *Mistra Sport & Outdoors-net*. Mid-Sweden University, with established research and outreach in winter sports, outdoor apparel, outdoor recreation and nature-based tourism, will serve well to host such a center. A network-based organization will be appropriate to involve partner universities and other organizations throughout Sweden, and beyond. Dialogue with stakeholders and a masterplan for a center will be presented as an output from Phase 1, whereas funding and implementation will be a goal for Phase 2.

10. Work-packages

WP 1: Understanding use of knowledge in sport and outdoor recreation – Path dependencies and transformations

WP-leader: *Sverker Sörlin, Professor, Royal Institute of Technology (KTH), Susanna Hedenborg, Professor, Malmö University (WP co-leader).*

Researchers: *Dr. Daniel Svensson, Chalmers Univ. of Technology, Gothenburg; Dr. Erik Backman, Dalarna University College; 2 post-docs, 1.5 PhD students (one externally funded).*

The aim of WP 1 is to research Sweden's main SOD actors and their relation to knowledge in the context of a long standing and comprehensive growth. Our preliminary studies have identified a need for more systematic use of knowledge to promote sustainability or transformations among the main SOD actors and its underpinning educational programs in Physical Education and Health (PEH). The underlying assumption is that knowledge will be a key factor in the transformations and that there is a *need to work closely with the main SOD actors: a) to understand past and present roles of knowledge in SOD and its organizations, b) to use this understanding in developing organizational cultures where relevant knowledge is actively integrated, and c) to initiate a process of entering sustainability and transformation into the core mission and everyday practices of the organizations.* This will be done with support from the co-creation process described above.

1. Understanding knowledge gaps – an analysis of baselines and patterns

We hold as a fundamental point of departure that transformations toward sustainability in this sector rely crucially on the commitment of its main actors. This makes knowledge and motivation key factors. We will therefore *focus on the actors and the way they shape their current relationship to knowledge and expertise*. In addition to the SOD-organizations on a national and local level in Sweden, WP 1 will also involve co-creation for sustainable development with schools and universities focusing Physical Education and Health (PEH). The research will depart from a comprehensive analysis of the strength and growth of SOD and PEH in Swedish society from the point of view of sustainability. Historical accounts so far have privileged linear growth of sport and PEH sectors and focused chiefly on the sport and PEH themselves (results, disciplines, competitions), social dimensions (participation, health, gender, markets), or ideas (nationalism, character, equity, learning). Our work will present a novel approach to SOD in society, identifying where, when, how, and why the (un)sustainabilities of SOD have emerged and solidified, and together with SOD organizations generate ideas and hypotheses that will be useful to tailor analysis to mitigate problems and assist the change needed to reduce the sector's environmental and carbon footprints.

WP 1 will be informed by *three framing theoretical perspectives*. One is theories on the *uses of knowledge in organizations* and the role of *path dependency* (David 1985, North 1990, Magnusson & Ottoson 1997, Pierson 2000) which will be used to explain continuity, and hence friction towards change, as we investigate cognitive patterns, routines, patterns of collaboration with research and expertise, but also the importance of built environment, societal values, organizational cultures, and behavior. The second perspective, *directional transformations* (Scoones et al 2015; Schot 2016), supported by the methodological co-production approach suggested in the 'action-oriented transformation research' framework proposed by Fazey et al (2018) points to the need for changes in the directionality of societal innovation in order to achieve sustainable societies. The third perspective, *recontextualization of pedagogic discourses* (Bernstein 1990, 2000), will help to explain how pedagogic messages (for example regarding sustainable development) are constructed, transformed and evaluated in educational contexts.

2. Identifying and analyzing issue areas – working with SOD partners

Current and past relationships to knowledge will be investigated through a set of issue areas which, we believe, have deeply affected sustainability (or the lack of it) in SOD. They are listed in the following. Our aim is to use these as candidates to be analyzed further in co-creation with the SOD organizations through learning-

teams. In the on-going evaluation of the project other issue areas may appear, and some of the proposed ones may be changed.

An analysis of the *decision-making and power structures of the SOD sectors* is seen as crucial for the initial part of the project. In phase I of the study, we will collect information on how decision-making and power structures of the SOD sectors have used knowledge and expertise in the past. It may be seen as a classic case of the so called 'iron triangles' (Hernes 1975) where sectorial interests are shaped by strong links between formally opposing interests between 'industry' (athletes/amateurs/performers/companies), 'state'/ public actors, and workers/regional interests. To this we may add questions related to how *research, education and innovation* have been used in decision making. A hypothesis is that decisions have been almost solely aligned with sectorial and to some extent broader *social* interests, not with *environmental* concerns (e.g. Grahn 2014; Barker et al. 2014). Together with WP6 and stakeholders, we will build future scenarios on the basis of what we know about the past to create examples of decision-making processes and policies for the achievement of more environmentally sustainable sport and outdoor recreation sectors.

Sport and PEH is deeply embedded in *foundational motivating ideas* (e.g. nationalism, gender, religion, masculinity; Ladd & Mathisen 1999, Ennis 2017) and used for goals of educational politics, what has been called the 'imperial' sports curriculum (Mangan 1993), and so is outdoor recreation which has been mobilized for social goals ranging from military defense to public health, and the fostering of 'ecological citizens' (Sandell & Sörlin 2008, Godtman Kling et al., 2018). An overarching goal has been social stability through character formation (*karaktärsdanning*), the improvement of citizens through performance enhancement and 'rational' training (Svensson 2014, 2016), and through sport as entertainment. In phase I, researchers together with SOD organizations will *identify and analyze the central institutional carriers* of these 'missions of SOD'. So far, there has been little engagement among the SOD actors to engage sustainability as a core mission in the production and circulation of motivating ideas.

Gender and age are important and linked to growth and environmental impacts. While SOD activities a century ago were primarily an activity for younger men from the higher classes of society, they now include as many women and people of all ages. Gender equality is crucial. In contrast to some other regions practice of physical activity is more common across gender and age differentials in the Nordic countries, with beneficial implications for personal independence and public health. Over time, a general pattern in sport has been *childification* – in which sports associations and agents in the commercial sports sector increasingly offer activities

for (younger) children (Lindroth 1991; Goksøyr 2008; Solenes 2009; Carlsson & Fransson 2006). Simultaneously, exercise and performance races, have become popular for all ages, including older men and women (Lindelöf 2015). This change is likely to have influenced SOD's environmental impact – how and in what ways, will be analyzed in the project. Inclusion of new groups in SOD will be studied focusing knowledge and expertise.

Personal wealth and individualized consumer patterns have made massive growth of unsustainable travel and leisure possible with little or no restrictions or attempts of steering or governance. SOD has been favored by this uneven development, and this includes the related nature-based tourism which has also expanded dramatically (Elmahdy et al., 2017). In addition, *innovation, business, and consumer products* are areas where there has also been considerable use of research and technology, although *sport and outdoor innovation* are understudied fields in the Scandinavian countries (see however Shove & Pantzar 2005, Fouche 2017). It may seem difficult for SOD organizations to counteract commercial forces. We believe, however, that decision making and policy within SOD has large *potential to steer consumption patterns*, just as it is now doing in other sectors such as air- and rail travel or private investment in solar energy for homes in response to climate change. In phase I, consumption patterns related to SOD decision making for example, related to equipment, attire and travel, will be identified and studied. The WP will collect information on how previous decisions on equipment, attire and travel have influenced consumption. Just as important is to relate to *the sharing economy* and alternative forms of co-ownership and co-use, including service innovation and product evolution. Hence, this research will be *done in collaboration with WP4 (recycling in the equipment life cycle) and WP6 (consumer behavior)*.

In the *educational context of PEH*, in schools as well as in universities in Sweden, environmental sustainability has lately been included in *policy documents* (Högskolelagen 2017; Skolverket 2011a, 2011b). However, environmental sustainability has not yet trickled down to the actual teaching (Mikaels 2017; Backman 2010). A further understanding of factors influencing the *construction and re-contextualization of pedagogic discourses* (Bernstein 1990, 2000) for SOD activities in PEH, and their potential for environmental sustainability, is crucial. This knowledge will develop through a co-creative process with pupils, PEH teachers, PEH teacher students, and PEH teacher educators. Specific attention will be given to how digital technology in PEH can promote or detach people's relation to nature and environment (Casey et al., 2017; O'Connell & Dymont, 2016; Hougham et al., 2018).

3. Sportification – a future driver of sustainability?

Outdoor life and environmentalism have strong historical connections (Sandell & Sörlin 2008), but the same cannot be said for sports. While many sports were born as sportified versions of traditional mobility (skiing, swimming, running, bicycling, horse-riding etc.), their environmental impact has grown tremendously over time through increased use of long-distance transport and specialized equipment. In sport studies, the concept *sportification* (e.g. Sandell et al. 2011; Svensson et al., 2016; Yttergren 2012) has been used as a tool for analyzing how most sports tend to develop toward increased regimentation, standardization, specialization, rationalization, equalization, and organization. In skiing, sportification has meant a development from wooden skis and home-made wax to fiberglass skis, fluoride-based wax, artificial snow, standardized arenas, and other standardizing innovations. In soccer, expanding domestic leagues and international competitions have increased long-distance (flight) travel. Sportification has so far worked *against* sustainability in SOD.

The question is: *Can sportification be turned around to support sustainability?* Are there sports that have been able to achieve that already? Are there differences between the traditional SOD-contexts and the educational context of PEH with regards to how sportification of SOD-activities can, or cannot, support environmental sustainability? There is substantial potential for lessons to be learned. For example, the sportification model includes ideas about equality in competition to preserve the uncertainty of the outcome. When such ideas have been threatened, as in elite football by the ever-increasing importance of financial strength, sport organizations responded with initiatives such as the UEFA Financial Fair Play Regulations (UEFA, 2019), designed to make football clubs adapt to a form of sustainable economy. Regulations regarding the use of performance-enhancing drugs and technologies dictate how far specialization and scientization are allowed to proceed. Such regulations inscribe new values into the sportification model and alters the logic which sport organizations operate under. Could environmental sustainability be inscribed into the *ethos* of sport in a similar way? Environmental concerns are already being voiced within the SOD sector. The Norwegian Ski Association has suggested a ban of high-fluoride ski wax in Norwegian youth skiing (Dagbladet, 21 November 2018). The Swedish Ski Association has begun a review of its environmental impact with focus on travel, equipment and food. Together with the organizations involved, we will identify case studies where environmental concerns have been or could become included in their practice.

Expected findings and contributions to new knowledge

The findings of WP1 will provide a richer and more nuanced understanding of historical and recent drivers of unsustainable (and emerging sustainable) behavior and habits in the SOD sector. More specifically we expect to;

- analyze existing use of knowledge and expertise in a set of major SOD organizations,
- work with SOD organizations to identify weaknesses in knowledge use and craft a model for how to absorb knowledge for transformations of missions and practices toward sustainability,
- identify key drivers behind the growth of SOD through historical analysis, especially those that drive SOD towards environmental unsustainability, and assess their significance,
- and test whether deep seated logics and ideals of sport such as sportification can be reconceived as part of new sustainable practices and prepare for implementations in Phase 2 of the program.

WP 2: Potentials for sustainable transport and mobility in outdoor recreation and sports-event planning

WP Leader: Anders Larsson, Associate Professor in Geography, University of Gothenburg.

Researchers: Dr. Ann Legeby, Researcher, Royal Institute of Technology (KTH), Stockholm; Dr. Jorge Gil. Researcher, Chalmers University of Technology, Gothenburg; 0.5 PhD student.

The research will be focused on the role of transport and mobility for the development of more sustainable SOD activities. It spans several scales from individuals' every-day life activities via events and organizations to municipal and regional levels. The methodological design includes analysis of national travel-time and time-use data, GIS based modelling of accessibility with different modes of transport, and test of a game-based approach for the reduction of emissions. The point of departure is conceived to be the traditional dependence on the car as the main mode of transport, whether this involves travelling with the family on a one-week ski holiday in a remote resort or dropping off children at the weekly football-training across town. The positive welfare effects relating to active outdoor recreation need to be understood in relation to the phenomenon's negative impact on the environment. Aall et al. (2011) found that the transport component of traditional outdoor recreation stands for a significant part of the energy consumption of all leisure time activities in Norway. The sustainable mobility turn (Banister 2008) has indeed shifted focus from transport as an activity in itself towards mobility as part of a wider societal development. However, the focus on urban contexts and every-day travel has led to a neglect in relation to questions of

leisure-time travel including sports and outdoor recreation (Holden 2016). The need to better understand how mobility and leisure-time activities are interlinked and incorporated in regional and urban planning processes is further reinforced by the fact that travel to leisure activities including tourism in developed countries today accounts for more than half of the total travelled distance. The WP is organized into three thematic areas and corresponding aims, with specific focus on the last two:

- To understand the long-term mobility and travel behavior shifts in relation to sports and outdoor recreation activities in Sweden.
- Utilize accessibility measures as catalyst for new sustainable transport – land use integrative solutions in sports and outdoor recreation planning on local and regional scales.
- Develop accessibility-based planning and management strategies to support integrated and more efficient approaches to planning for sustainable sport and recreation activities in different environments, across traditionally separated administrative divisions.

Theoretical frameworks

The first theme focuses on changing behavior through analysis of shifting mobility patterns over the last two decades. Part of the conditions for the development of sustainable mobility landscape (Banister 2008) is to understand the long term trends of how and with which modes people travel to different activities. This stage will be conducted in cooperation with WP1, where the long-term societal shifts are studied. A common pool of data between WPs will be developed for this task. The second theme aims at developing a geodata-based methodology for evaluating environmental and social effects of planning alternatives for input into real planning practice. Knowing the role of travel specifically for SOD activities and its relation to other activities developed together with WP1 creates a platform for understanding present and future sustainable solutions. The potential role of mobility in relation to the spatial location of activities for individuals and different groups in society is captured by the concept of sustainable accessibility (Curtis & Scheurer 2010, Ellder et al, 2018). It provides a very useful framework and analytical tool in order to analyze and compare the potential for specific forms of SOD activities at specific places with regards to the impact of location and different modes of transport as well as for example simulating the effect of higher fuel prices (Büttner, Wulfhorst et al. 2016). The conceptual framework of sustainable accessibility provides a new take on transport – land use integration, highlighting the potential for proximity and slow (and more sustainable) modes of transport such as walking and cycling. Together with analysis of environmental impacts of

planning scenarios we will put emphasis on social sustainability issues such as equal spatial access across population groups to sports and outdoor recreation opportunities. This work will be closely coordinated with WP3 in terms of place-based cases and research questions in order to safeguard a comprehensive take on both transport and spatial planning.

The third theme focuses on implementation in planning practice. It will be conducted in tandem with the activities in WP3 (planning challenges, case-areas) and WP5 (events), and follows the approach of co-creation and knowledge development. From a governance perspective, traditional ways of solving problems often have a strong position on the basis of organizational and institutional trajectories (Curtis & Low, 2012). The fact that transport accounts for one third of greenhouse gas emissions and that urban areas are seeing increasing levels of social and economic segregation are examples of problems that the current “silo-based” planning system struggles to address. The fact that the accessibility concept includes both the mobility and land-use components makes it very suitable as a tool to support integration in spatial planning. Accessibility-based planning provides measures and tools that need different stakeholders and knowledge bases to interact and, therefore, overcome traditional organizational and cognitive barriers in local and regional spatial planning. Research (Curtis et al., 2016; Boisjoly and El-Geneidy, 2017; Silva and Larsson, 2017; Gil Solá et al., 2018) indicates that there are several benefits to gain from such approach.

Material and methods

The initial theme is based on the analysis of national travel-time and time-use data for the entire Swedish population over the last 20 years. In close association with WP1 we compare social- and age groups, gender and mode of transport against different geographical contexts using spatial analysis and Geographic Information Systems (GIS). A number of case-studies will accompany the statistical analysis in order to provide an in-depth understanding of transition mechanisms. The approach rests on the co-creation process where stakeholders and researchers collectively identify planning problems already in the initial stage of the project. The WP will work closely with a learning-team to support the process from problem identification to implementation of solutions. The second question introduces the analysis of potential accessibility to a number of selected SOD destinations and events. Once practice-relevant cases have been identified, we will use register-based microdata to identify population and activities combined with car, bicycle and walk networks and open source data for public transport travel. The methodological design involves GIS based modelling and testing different scenarios of accessibility to different activities with different modes of transport, including the potential reduction of emissions (Glaeser & Kahn, 2010; Määttä-

Juntunen et al., 2011). Analysis will be based on planning problems identified together with the participating stakeholders, carried out in close collaboration with WP1, WP3 and WP5. The third research theme will use interactive workshops with researchers and planners together with WP3 and WP5. The workshop method is based on the principles of experiential learning (Kolb and Kolb, 2008), with a specific application in transport and land-use planning (Straatemeier et al, 2010; te Brömmelstroet et al, 2014; Gil Solá et al, 2018). This includes a continuous process of interaction and feedback centered on real planning problems with the aim to support learning. In this process we will test a game-based approach to be further developed in a possible second phase of the project. Stakeholder cooperation is already developed with Västra Götaland Region and Lilla Edets Municipality. As part of the process we will develop a model for dissemination of results in a form that enables efficient uptake in planning organizations.

Expected findings and contributions to new knowledge

The findings are expected to contribute to the knowledge of how sports and outdoor activities are interlinked with sustainable accessibility and how this relationship can be better included in local and regional planning processes. More specifically we expect:

- Knowledge of the long-term trend in the role of travel/transport in SOD activities as well as knowledge about individuals' travel behavior and time-use.
- New knowledge, tools and measures to support creation and evaluation of scenarios for path-breaking solutions of sustainable access to SOD activities in different geographical and governance contexts.
- The experiential learning approach applied to accessibility-based planning will provide a new model for interaction between different actors and lead the development of new mobility and land-use solutions to support innovative sustainable planning strategies for SOD activities in cooperation with WP3 and WP5.

WP3: Sport and outdoor recreation through the lens of land and water use – Ecological effects and spatial planning options

***WP leader:** Marie Stenseke, Professor in Human Geography, University of Gothenburg (WP leader); Sara Borgström, Assistant Professor in Sustainable Urban Development, Royal Institute of Technology (KTH) (WP co-leader); Sandra Wall-Reinius, Associate Professor in Human Geography, Mid Sweden University (WP co-leader).*

***Researchers:** Erik Andersson, Associate Professor in Systems Ecology, Stockholm University; Dr. Rosemarie Ankre, Researcher, Mid Sweden University; Dr. Andreas Skriver Hansen, Researcher,*

University of Gothenburg; Peter Fredman, Professor of Tourism Studies, Mid-Sweden University; 3 PhD students (1 Environmental studies, 0.5 Tourism studies, 0.5 Human geography).

The overall aim of WP3 is to contribute to and support environmentally sustainable use of land and waters for sport and outdoor recreation activities that also meet social and economic global sustainability goals. More specifically, the WP will address the knowledge gaps when it comes to how to appropriately integrate SOD into spatial planning, enhance the use of research-based knowledge of SOD in spatial planning and connecting to sustainable planning concepts, such as green infrastructure (Petersson Forsberg 2014, Slätmo et al. 2019). Spatial variations in both the physical landscape and the socio-economic characteristics imply different prerequisites and demands for SOD as well as environmental effects thereof in different parts of Sweden. At the same time, it has to be recognized that there are significant differences between people's motives and ways of interacting with their physical landscape through SOD activities. Following these spatial variations, management of land and water use, including keeping track of ecological effects, are largely carried out at municipal and regional levels in Sweden. Hence, perspectives, actors and actions at these levels are crucially important when co-creating knowledge for more sustainable practices within the SOD sectors. There are three partly overlapping objectives for this WP:

- a) Increase the knowledge about how to minimize place-specific ecological effects, while enhancing SOD activities;
- b) Increase the knowledge about SOD practices, and the developments in/of these, related to the use of the physical environment among various groups of people;;
- c) Increase the knowledge about how to enhance sustainable SOD in different environments through planning and management strategies (together with WP1, WP2 and WP5).

In order to cover a variety of spatial contexts with significant differences when it comes to sport and outdoor recreation, the WP will engage with three different types of landscapes; urban and urbanizing areas, coastal-marine areas and mountain areas. The WP will be carried out in close collaboration with local and regional public actors in order to address relevant challenges, test hypothesis and results, and evaluate and implement possible solutions as described in the co-creation process above. WP3 will also benefit from insights about the broader societal context developed in WP1 and interact with WP2 (transports) and WP5 (events), specifically when it comes to exploring place specific planning and practical management. There will be interactions with WP6 regarding changing behaviors as well as future directions for policy and strategic planning with respect to land and water use.

Theoretical entry points

WP3 builds on an integrated perspective on humans and their environment, i.e. a landscape approach (Laven et al. 2015). Landscape is understood as a process, where material features of human and/or non-human origin co-evolve with socio-economic features, institutional components and intangible aspects such as values, traditions and knowledge (ESF 2010, Stenseke 2016, Antrop & Van Eetvelde 2017). In order to enhance and ensure sustainable use of the physical environment, SOD has to be considered as one aspect of multi-functional land and water use, where synergies and conflict with other societal interests in the areas might occur, including aspects of justice and equity for immigrants in their use of green areas (Stenseke et al. 2012; Godman Kling et al., 2019, Wall-Reinius et al., 2019). Approaches and theories to be used relate to recreation ecology (Monz et al. 2013, Marion et al. 2016, De Valk et al. 2017, Scholte et al. 2018) as well as political ecology especially regarding actual and perceived accessibility and conflicts of interests (Agyerman & Evans 2004, Walker 2009, Dahlberg et al. 2010, Rutt & Gulsrud 2016, Turner 2016). As for human-environment relations, we depart from The European Landscape Convention's definition of landscape, "an area, as perceived by people" (Council of Europe, 2000; Article 1) and Sandell's Eco-strategic Framework, which gives a structure for mapping different potential perceptions and use of the physical environment in relation to functional landscape specialization and adaptation (Sandell, 2016).

Methods and materials

The research in WP3 will be carried out in three case study areas, each of them representing landscape types of great interest for various SOD activities, but also landscapes that contain other land use interests, which implies risks for conflicting situations due to high pressure on the ecosystems and ecosystem functions as well as on human interactions and relations.

The greater Stockholm area; The ongoing densification of cities has several effects on green space with relevance for their use and overall ecological capacity (Hansen et al. 2017). The densification process also results in increased and diversified uses of green infrastructure in the peri-urban landscape. These uses must be managed by a rather unclear governance situation and considered together with other current and future ecologically based land use demands such as agriculture (Hedblom et al. 2017). Furthermore, when some of the SOD activities is relocated from the urban to the peri-urban landscape it will change the transport and mobility needs in relation to SOD, which links to WP2.

Coastal-marine areas in Göteborg and Bohuslän counties; SOD activities in the coastal zone (i.e. covering both terrestrial and marine areas) have a long tradition in Sweden and are developing fast, primarily in the form of new types of activities and technology uses (Hansen 2016). At the same time, the coastal-marine landscape is also one of the most understudied landscape types in Sweden when it comes to sport activities and recreational uses (Hansen 2016). For this reason alone, SOD activities in the coastal zone, and the new challenges and implications for the coastal-marine environment that they lead to, are worth studying. This need is further emphasized by current efforts within coastal and marine spatial planning and management, which have received increased attention in recent years, and which very well may determine the future of SOD activities in the coastal zone.

Jämtland county: An increased and more diversified recreational use of the mountain landscape together with the presence of other land use interests (e.g. reindeer herding, forestry, nature conservation areas) has led to land-use conflicts between actors who use the landscape for different purposes (Zachrisson & Beland Lindahl, 2013). Neglecting these conflicts can result in degradation of important socio-ecological values (Wondolleck & Yaffe, 2000). Wear and tear on the ground, and disturbance on animals, are increasingly seen as a major problem in the mountains (Godtman Kling et al. 2019). The mountains are also increasingly being used for sport events (Newsome & Hughes, 2018), which create various challenges, pressures and competitions for land use and its resources (cf. WP5).

While the studies in these three areas will have different profiles, depending on the socioecological context as well as on what problems and research problems are identified in the co-creation processes respectively, issues concerning ecological effects, and governance, will be addressed. In order to identify relevant research topics, a learning-team focusing on land and water use, as well as governance options, including planning, will be established in each of the three case areas. These learning-teams will be populated by people from regional administrative governmental bodies, foundations managing public green areas, concerned municipalities, other relevant public actors, organizations and companies involved in outdoor recreation, sport, and events. Collaboration in these groups requires a continuous process which has to be allowed enough time, not least to build trust, learn together and establish mutual goals, and if possible, it is useful to also take advantage of existing social networks (e.g. Colemand & Danks, 2016; Zachrisson & Beland Lindahl, 2013). Stakeholders already involved includes Regions, County Administrative Boards and selected local municipalities in the Stockholm, Göteborg/Bohuslän and Jämtland, NGOs and private companies related to SOD.

As emphasized in the Gothenburg case area, the use of new technologies not only in sports and outdoor activities but also in the management of these activities is fast becoming an important area of research (Hansen 2016). In order to explore this theme more, a close collaboration is planned with the on-line platform "naturkartan.se" (www.outdoormap.com), to gain more detailed knowledge about users in nature, to better understand impacts from SOD (drawing from activities in WP1 and WP2) and studying tools to govern future behavior with new technology (feeding activities in WP6). Naturkartan.se is a app-based platform with over 390 000 unique users, which aims to circulate information about interesting nature areas and recreational experiences around Sweden. The research will focus on developing and testing basic monitoring activities such as exploring user numbers, movements and concentrations of people. Moreover, it will be configured to profile users as well as interact with users, tapping into the concept of citizen science and user empowerment and involvement. A new app function will be developed that automatically and continuously collects and analyses data from ongoing user activities. This will provide unique user-generated data, which can be utilized in management of SOD to help minimize user impacts and optimize various user experiences. The idea is to development, design and test the new app function parallel with step 1-3 below, while a full-scale implementation is planned for the second phase of the program (years 5-8).

In step 1, workshops will be held with the learning-teams in order to identify and detect relevant research topics and appropriate ways of commencing and carrying out research. In doing so, the research topics and themes developed in the transdisciplinary process at the program level will be communicated to the learning teams at the regional level. In step 2, case studies will be conducted with a stricter scientific approach, and some carried out with significant knowledge co-production together with local and regional stakeholders. The studies will be performed in the areas of competence in the research team; recreation ecology, behavioral studies, spatial planning, SOD management and governance. We will, to a large extent, use mixed method approaches where qualitative and quantitative methods are combined, including spatial analysis, surveys, document content analysis, interviews and focus groups, approaching event makers, planners, managers, sports- and outdoor organizations as well as the general public. GIS will be used to map ecological characteristics as well as to map and find synergies and conflicts between e.g. different user groups and activities as well as outcomes of different planning strategies and practical management for social and ecological values. In step 3, the results from the studies will be discussed in the learning-teams and tested in collaboration with the stakeholders. More specifically, results from WP1, WP2, WP3 and WP5 will be brought to the table and considered in an integrated way. Opinions, experiences and conclusions from the stakeholder

collaboration will inform more sustainable decision-making; enhance the efficiency of environmental policies (due to a better understanding of different perspectives); and stimulate creative solutions for future planning and management. We will also work towards a concept to make it possible for many organizations to understand, use and implement the solutions/findings.

Expected findings and applications

- Measures to minimize the ecological effects of SOD while also enhancing experience values in SOD activities.
- Innovative planning strategies for sustainable SOD activities and how they can be combined in multi-functional (blue-green) spaces, and in physical planning processes on local and regional levels.
- Identification of what ecological structures and processes are essential for and/or especially sensitive for SOD activities in urban, peri-urban, and rural landscapes.
- Planning, management and strategies for urban and peri-urban environments, coastal-marine and mountain areas that sustain ecological qualities and enhance SOD activities among various groups.
- Exploration and possible implementation of new technologies in the management of SODs.

WP 4: Sustainable sport and outdoor equipment – Smarter materials and material flows

***WP leader:** Mikael Bäckström, PhD, Professor in Mechanical Engineering, Head of Sports Tech Research Centre, Mid-Sweden University.*

***Researchers:** Assoc. Prof. Anna Björklund, KTH, Skolan för arkitektur och samhällsbyggnad (ABE), Samhällsplanering och miljö, Miljöstrategisk analys. Dr. Itai Danielski, Department of Ecotechnology and Sustainable Building Engineering, Mid-Sweden University, 1.5 Post-doc, 1 Lic student, 1 Research Engineer, Mid-Sweden University, Sports Tech Research Centre.*

Most of the SOD activities that people participate in are highly equipment and technology dependent. Companies in the sports and outdoor industries contributed approximately SEK 22.3 billion to Sweden's GDP in 2013, and SOD clothing and equipment constitutes a significant share of the expenditures people put on their outdoor activities (Boman et al., 2013; Fredman et al., 2010). Even the least equipment-intense sports and exercise such as swimming do need some equipment such as swimming trunks or a swimsuit. Hence, materials and

equipment and their use in SOD activities is a point of departure for this WP, which partly draws from the findings in WP1 and feeds further studies in WP6. Two related themes are in focus – *how materials used in SOD equipment can be more sustainable and how to integrate recycling including reuse in SOD equipment and materials*. Integration of environment assessment tools and advanced material tests in a laboratory setting are key methods in this WP to address the two abovementioned themes.

Research logics

In order to align the efforts in WP4 with the society needs, and the overall program, it will be based on the following research logics;

Step 1: Co-creation process to identify areas (products) that involve challenges to continue working with and that partners want to research and develop. The first co-creation step will also address how LCA can contribute into other WPs, to investigate life cycle impacts of the “challenges” posed in those WP. This could concern for instance buildings, facilities, transports and/or events, and will be determined in detail following the recruitment of the postdoc in WP4. Information from Step 1 do form the input to system analysis overall as described in Step 2.

Step 2: Overall system analysis is important to screen, identify and quantify what problems are expressed as most significant from all stakeholders interested in the research program. This approach to understand the bigger picture is of course also necessary to prioritize work tasks.

Step 3: Based on the results of Step 2, we will develop (conceptual) proposals for solutions with good sustainability potential. In cases where possible test proposals in laboratory or in field to find out the aspects / parameters needed to evaluate the solutions in Step 4.

Step 4: Evaluate solutions, map different aspects (function, environmental LCA, consumer needs, manufacturer’s perspective multi-criteria). Iterate back to Step2 / Step3 to develop revised / improved solutions.

Methods and research areas

LCA methodology will be integrated as a systematic approach along in all steps 1-4 as described in the research logics above. For instance, the life length of SOD equipment is critical when quantifying life cycle environmental impact of SOD

equipment per usage cycle. Life length can then be tested in the laboratory environment at the Sports Tech Research Centre at Mid-Sweden University, simulating real life conditions and usage, using combined testing methods. For LCA of novel materials at early design stages, methods for prospective LCA (Arvidsson et al., 2018) will be applied. The main idea is to expand knowledge and industry practices with special focus on the equipment itself, which in many cases is a prerequisite for participation in SOD activities. Nevertheless, LCA will also be integrated in other WP to address critical aspects in other themes of SOD, as decided through the co-creation process. LCA, as an environment assessment tool will also be integrated in product development. Future scenarios to mitigate environmental impacts, can be implemented in LCA models by using prospective LCA, with pre-defined "background" systems, and scenario analysis methods. Such scenarios could include the implementation of emerging technologies, design of exchangeable parts, repair, share economy, co-ownership, reuse, and end of life with circular economy. The results can serve as an input to WP6 (Behaviour, policy and future change).

Life cycle cost (LCC) is an economic assessment tool that could also be used for different kinds of apparel and equipment used in SOD. It is not well researched so far, and several "homemade" models are in use by companies trying to improve their sustainability in the manufacturing and recycle processes. This research will therefore focus on both practices and theories related to circular industry in the SOD sectors. Based on earlier pilot-project work with the focus on "Sustainability in Sports and Outdoor", progress made by the companies towards sustainability did involve elements such as: Fulfilling the goals by building a sustainability strategy (vision, current situation, gap, setting goals and making their work measurable); Cooperating with other companies on key issues; Communicating their sustainability work internally and externally; Putting sustainability on the everyday agenda; Better knowledge of sustainable material flows in early product development process. The research in this WP will draw from these experiences.

The research in Step 3 will utilize the *laboratory environment at the Sports-Tech Research Centre at Mid-Sweden University, one of Europe's leading laboratory environments for sports technology*. It includes a wind-climate tunnel lab, additive manufacturing lab, material testing lab, and sensor and electronics development "in-house" opportunities. Laboratories provide great access to several test methods that already follow established norms. Many properties, such as water repellence, wind-proofing, abrasion resistance, colorfastness, UV ageing, dirt repellence, tear strength and fireproofing are tested individually. However, to determine the complex loadings that a product is exposed to during actual use and its predicted life, it is necessary to develop large-scale cyclic testing, in which series of part-

methods could forecast how the fabric works in a finished product. Synergies are also expected with other projects, such as POPFREE run by RISE and financed by Vinnova venturing to find alternatives to PFAS (polyfluorated chemicals) and the project Augmented Sports run by Sports Tech Research Centre/Mid Sweden University, serving Mistra Sport & Outdoors with test equipment, laboratory facilities and contacts with manufacturing companies.

1. How can materials be used, and toxic chemicals reduced, to increase the sustainability in equipment?

The research in this theme is focused on more efficient use of materials, reducing harmful chemicals, and reducing the use of fossil-based polymers in SOD equipment and clothing. Many of the chemical companies, which manufacture textile water repellents, have more or less stopped using the worst fluorocarbons, PFOA and PFOS, though their usage is still increasing in Asia. Chemical companies have now started to manufacture textile water repellents containing shorter fluorocarbons (C6 or C4) with a reduced performance that have been detected in the Antarctica (Llorca 2012), in snow (Cai 2012), in drinking water (Dauchy 2012), in rainwater (Eschauzier 2010), and in human blood (Berger 2012, presentation) and breast milk (Jensen 2008). A question of interest for this WP's theme will be how more environmentally friendly materials can enter the SOD production processes and markets?

One challenge in the SOD sectors is the use of polymers and plastics manufactured from regular oil. Large amounts of plastic are used in very short-lived applications such as packing material, plastic bags, single use glasses, cups, cutlery and plates. Much of the clothing used in SOD activities is also based on polymers. The same applies to backpacks, tents, canoes, climbing ropes, soles of hiking shoes, skis, goggles, helmets, trail sleds. When examining all the use of the polymers in SOD one realizes that the development of recycled and carbon dioxide neutral polymers must have a greater impact on the equipment development. When comparing how the validation of product performance is done in different industrial branches it is striking that in SOD it is only products intended for safety purposes such as climbing harnesses, helmets, ropes that must meet testing protocols. There is hardly any type of environmental assessment connected to SOD equipment manufacturing, which is far behind many other industry products like automotive, buildings construction, domestic electric appliances, and even food products.

Previous research has resulted in different testing standards that can address specific features of the textile. Often, the features are tested one at a time and the

test results are, therefore, not correlated to real life use of the product. This leads to the fact that the development of the product is done “half-blind” meaning that an indicative test of one-at-a-time features is the guidance in selecting material and design. This leads to a need to investigate and develop the testing procedures and methodology to constitute a part of the product development cycle. Hence, the research will address the following topics:

- Stratify the information from the co-creation process in the research logics Step 1.
- Based on the results in the research logics Step 1 and 2, develop (conceptual) proposals for solutions with good sustainability potential. In cases where possible test proposals in laboratory or in field to find out the aspects / parameters needed to evaluate the solutions in Step 4. Tasks are expected to address:
 - What new types of environmentally friendly garment treatment can work satisfactorily compared to textile and finished products with regards to water and dirt repellence?
 - How can the standardized test procedures be developed and correlated to real life use of the textile?
 - How can several test methods best be combined to give further information on the usability of a tested fabric in real conditions?
 - How can new standards based on real life-like test methods be developed in a wider context?

2. How to integrate recycling through reuse in the equipment life cycle? Design, processes and business models for smarter material flows.

Most current research endeavors in the field of product and material development are focused on primary product use, and environmental assessments are, at best, done after one full product lifecycle. There is an inherent challenge to transfer from linear supply chains into a circular industry context (Nasir et al., 2017), aiming for longer material flows that minimize the resource use and negative environmental impact, while optimizing use experience and product performance. There is a need for new approaches in both material and product design and business modelling that cater to this new paradigm. Well-known topics such as re-use and recycling are just a few examples of the new criteria for designers and developers in a circular industry era.

LCA, in this WP's theme, relates to the reuse of materials and circular production chains, targeting both functionality and sustainability. Equipment and clothing in the SOD sectors have large potentials for new forms of market exchange recognized in the sharing economy. Since the environmental benefits of sharing,

from a life cycle perspective are obvious – secondary markets reduce demand for new goods, so ecological footprints go down – it should have the potential to provide a new pathway to sustainability (Heinrichs, 2013). However, despite the widespread belief that the sector helps to reduce environmental impacts, there are almost no comprehensive studies on this topic on SOD specifically. Concepts of systemic design and tools for assessing material flows in early development stages are good starting points to model this new reality. Criteria for product and materials development need to change, and the designer is key in this process as a primary criteria-setting agent. Hence, in this research the designer and product developer are in focus. Supporting tools and approaches for the early stages in their work are crucial to set the stage for a systemic change towards circularity. Trends and societal development in combination with politics and demands by law forms the complex contextual background that determine what products are manufactured and bought by the end users. Hence, questions of interest concerns;

- What is governing the equipment buyers' demands?
- How the emerging trends in sustainability affects them?
- And how this can be transferred to the production processes of the outdoor industry?

The manufacturing companies deal with the duality of following the market demands as they are also leading customers. One of the new demands for both parties are true sustainability, but what this means is not yet thoroughly defined by either part. In order to better understand that interplay, this WP utilize results on consumer behavior from both WP1 and WP6. Through the co-creation process, questions of interest for the SOD sectors will be identified and elaborated. Co-operation is planned with the Scandinavian Outdoor Group (umbrella organization for outdoor equipment), Fjällräven, Östersund Municipality and Region Jämtland-Härjedalen.

Expected findings and contribution to new knowledge

This WP is aiming at reduced and smarter material flows, and approaches to integrate reuse and recycling in the equipment life cycle. This will be studied through better understanding of stakeholder in the equipment envelope of both users, manufacturers and governing laws. Many good approaches of initiatives aiming towards eco-design and sustainable manufacturing have been reported (e.g. Short et.al. 2012, Deutz et.al. 2013). The research in this WP will contribute to clarify how different desired functionalities of SOD equipment can be quantified. New knowledge will be produced on several impact areas. Findings are expected to contribute in examples on how to simplify the way material can be utilized in

the technical design process. This is reflected in new development of materials that are undergoing in the base material industry and in academia, but also how known materials are utilized in new ways, including reuse and recycling in a life cycle perspective. A major benefit from a societal sustainability perspective is a more efficient design process where excessive use of materials is avoided. Furthermore, means and solutions drawing inspiration from the concept of a circular economy will be developed at a conceptual level, contributing to a more sustainable SOD sector overall.

WP 5: Event management in sport and outdoor recreation

WP-leader: Robert Pettersson, Associate Professor in Tourism Studies, Mid-Sweden University.

Researchers: Dr. John Armbrecht, Senior lecturer and Dr. Erik Lundberg, Senior lecturer, University of Gothenburg; Lusine Margaryan, Mid-Sweden University, 1 PhD student.

Events in the SOD sectors have important economic, social and environmental consequences (Getz & Page 2016). They drive and shape practices within SOD by acting as meeting places, markets, and celebrations of SOD activities for a multitude of actors, such as professional and amateur athletes and other participants, spectators, fans, tourists, locals, associations and corporations. Hence, the aim of WP 5 is to contribute to more sustainable SOD sector in Sweden by analyzing spectators' and participants' behavior in close collaboration with the event industry in Sweden based on the co-creation process described above. Researchers together with event stakeholders will explore attitudes and behavior of event participants and spectators, event organizers' strategies and the impacts on communities from a sustainability perspective. WP-members will support the development of sustainable SOD events in particular and a more sustainable SOD industry in general. The WP will operate with two research topics. The first focus on the implications of mobility and event related consumption in relation to SOD events. The second topic focuses on the opportunities and challenges related to managing sustainable SOD events. By matching these demand and supply perspectives, the outcome will facilitate policy and strategy development within the sector.

The central theoretical concepts of WP 5 are serious leisure (Stebbins, 1992) and the development of travel-careers applied in an event context (cf. Getz & Andersson, 2010). These concepts help us understand how the development of leisure interests in SOD are connected to event consumption and consequently possible challenges from a sustainability perspective. This work-package connects to, and are strengthened by, the other work-packages in several ways:

- How the emergence of SOD activities has led to today's supply and demand of SOD events (WP1)
- How transportation needs to develop in relation to different sports and outdoor events (WP2).
- How negative socio-environmental impacts from SOD events can be minimized (WP3).
- How consumption develops in terms of event related equipment (WP4).
- How new event business practices can be developed and how event producers and consumers can transform their attitudes and behavior to ensure more sustainable practices (WP6).

Events, SOD and sustainability

The event sector has many strong links to the SOD sectors, promoting amateur running and endurance events (marathons, triathlons, trail runs, orienteering, etc.), team sport events (youth- and amateur tournaments in a wide array of sports or professional tournaments), professional sport events (league games, championships, international tournaments etc.), parasport events etc. The events attract both active amateur *participants* (e.g. runners at Stockholm Marathon or players at Gothia Cup), professional athletes, as well as *spectators* (fans, family, friends, leaders etc.) and companies marketing SOD products and services. Sweden in particular has a large and growing market of participation sport events, such as the ones noted above (e.g. running, cycling, amateur team sports etc.). This indicates that people want to be actively involved in the event, co-create experiences and interact with peers in an event context. Here, the event acts as an arena for the fulfilment of various serious leisure pursuits (Stebbins, 2006).

Several positive and negative impacts can be observed from SOD events (Getz and Page 2016, Hall and Page 1999). Positive economic impacts (job opportunities, incomes, broader economic base etc.) meets with potential negative economic impacts (seasonality, rise in prices etc.). Social impacts have gained more interest from event organizers and researchers lately (such as increased social capital, increased quality of life, pride etc.) together with increased risks (alienation, criminality etc.). With the growth of the event sector comes a number of sustainability challenges especially connected to environmental issues and the increased mobility and increased material consumption. For example, Case (2013) pinpoints two important interactions between the event industry and the environment: resources used in staging an event (e.g. food, materials, energy, fuel); and environmental impacts on the macro (e.g. carbon dioxide emissions) and micro level (e.g. trampling, littering). Researchers participating in WP5 have previously developed methods to evaluate events from a sustainability perspective, including economic, socio-cultural and environmental impacts in a

Triple Impact Assessment-framework (see Andersson & Lundberg, 2013; Andersson, Armbrrecht & Lundberg, 2016; McCullough et al., 2018) and the multi-dimensional model named Event Compass (Getz 2018).

Theoretical conceptual framework

The concept of serious leisure (cf. Stebbins, 1992) is used to understand participants' and spectators' involvement and consumption of events. It is also connected to how these actors create event travel-careers, which imply mobility, and other event related consumption. The use of these concepts and the explicit connection to sustainability challenges will extend existing event specific literature, literature on consumer behavior and thereby contribute to the SOD field.

Individuals' engagement in recreational activities develops and often individuals become increasingly serious about their activity. This development is described by the concept of serious leisure which is "...the systematic pursuit of an amateur, hobbyist ... activity that is highly substantial, interesting, and fulfilling and where ... participants find a career in acquiring and expressing a combination of its special skills, knowledge, and experiences" (Stebbins, 1992: 3). Pursuing a serious leisure can lead to deep self-fulfillment and is different from casual leisure by six characteristics: the need to persevere in the activity, availability of a leisure career, need to put in effort to gain skill and knowledge, realization of various special benefits, a unique ethos and social world, and an attractive personal and social identity (Stebbins, 1992). We suggest that events play an important role to fulfill these goals. Shipway and Jones (2008) applied the serious leisure framework to runners' and classified them as 'serious sport tourists' on the basis of their ability, length of trip and stay, and (relatively high) cost of training for the event (p. 65). For some the marathon was a "career marker", "...representing a confirmation of their progression to confirmed serious runner" (p. 72). The collection of sub-culture capital leads to "...the desire to travel and collect places" (p. 72), to become more and more involved in their sport.

In their study of a half marathon, Getz and Andersson (2010) described how experienced and involved amateur participants differ from less involved runners. Highly involved participants displayed a more developed event career by being more serious in their preparation, travelling more often and farther for running events; they were also more demanding regarding quality, and had different criteria for selecting destinations and events compared to less involved participants in the same event. Highly involved participants were also more likely to consume more specialized equipment leading up to the event. Serious Leisure (Stebbins, 1992, 2001, 2005, 2006) and involvement (Havitz and Dimanche, 1999;

Getz and Andersson, 2010) suggest that individuals with more experience and involvement will develop individual event “careers” reflecting their progression in terms of experiences, motivation and behaviours (Pearce and Lee, 2005). This concept has been specifically adapted and applied to sports and events in a theory of the “event career trajectory” (see Getz & Andersson, 2010; Getz and McConnell, 2011; Lamont and Kennelly, 2011).

Material and methods

WP5 benefits from the iterative approach of the research program, where partners and researchers collaborate in a co-creation process. Thus, *The Swedish Sports Confederation* (including *The Swedish Paraspport Federation*) and *A Swedish Classic* (e.g. the events *Vasaloppet* and *Lidingöloppet*) will be part of an iterative process of common reflection, learning and development. The startup of each iteration consists of a joint planning session (workshop). The starting point is the current scientific knowledge and the needs and challenges experienced by the event organizers. As such, the event producers contribute to the framing of the data collections. To understand the opportunities and challenges related to sustainability of SOD events from a management perspective, workshops, interviews and a survey to Swedish SOD organizers will be performed. Both the Swedish Sports Confederation and A Swedish Classic have extensive networks that assure that we can reach large parts of the SOD event sector.

To understand the implications of mobility and event related consumption in relation to SOD events, surveys to event participants and spectators of several events with differing characteristics, such as amateur, professional, participant, spectator, youth, and team events, will be sent out. The precise events will be decided together with partners to cover a wide range of event consumer behavior, but e.g. participant events within a Swedish Classic, parasport events, and events organized by member federations of the Swedish sports confederation may be targeted. In addition to surveys, interviews with event participants and spectators using life-history methodology is proposed. This will help understand how current behavior has been influenced by life events and decisions made historically. This mixed-methods approach (surveys and interviews) will highlight the complexity, scope, and urgency of implications, which feeds into the iterative processes together with partners.

Expected findings and contributions to new knowledge

Overall, this work-package contributes to a better understanding of the supply and demand sides of SOD events. By mapping and analyzing the implications of

consumption patterns of SOD event consumers (participants and spectators), potential sustainability challenges for event organizers can be addressed. Hence, new knowledge will cover e.g.;

- transport to/from/at the event destination,
- material consumption before, during and after the events,
- accessibility to and at the event for people with disabilities.

The findings will thus support event strategies where conscious event producers can facilitate event spectators' and event participants' behavior in a long-term sustainable way. During the second phase of the program, the vision is to deepen the dialogue with the event sector and implement learnings and conclusions. The iterative approach will continue throughout the entire project. From a theoretical perspective, the application of a sustainability lens to the concepts of serious leisure and event travel careers is a contribution. Previously, the focus of these concepts has been mostly individualistic (i.e. the self-fulfillment, happiness, experiences, skills development and involvement of individuals in their serious leisure and event travel career pursuits), but with a sustainability lens we can, in addition, consider implications on a societal level.

WP 6: Towards sustainable development in the sport and outdoor recreation sectors – Behavior, policy and future change

WP leader: Dimitri Ioannides, Professor of Human Geography, Mid-Sweden University

Researchers: Mid-Sweden University; Daniel Laven, Associate Professor of Human Geography, Mid-Sweden University; Peter Fredman, Professor of Tourism Studies, Mid-Sweden University. 2 Post-docs, 1 Licentiate student.

In tandem with the preceding work packages (1-5), WP6 targets promising practices and innovative policies for sports and outdoor recreation in Sweden. In line with the co-creation process described earlier, WP6 interacts with WP1, which sets the historical point of departure regarding how the pursuit of sport and outdoor recreation (both in terms of participation but also spectatorship) have evolved and taken root within Swedish society. The overriding aim of WP6 is to overcome path dependency (in terms of institutional structures, behavioral norms and infrastructural investments). Thus, together, WP1 and WP6 will provide past, present and future perspectives on achieving a more environmentally sustainable sport and outdoor recreation sector. To our knowledge, the joint work by WP1 and 6 offers the first such comprehensive analysis of the sector in Sweden. As a result, this ensures that WP6 can offer new ways of thinking and acting when it comes to

the governance of the sport and outdoor recreation sector in an environmentally sustainable manner.

A key part of the overall co-creation process is the ongoing engagement of and dialogue with key stakeholders. Together with WP1, WP6 has initiated an ongoing and interactive dialogue with each of the thematic WPs (2-5). WPs 2-5 represent the primary content areas of this MISTRA project and, in turn, form the arenas around which we will formulate policy and behavioral change. Specifically, WP6 plans to utilize the co-creation process as a means of engaging: (a) the key stakeholders involved in the project and; (b) a learning group comprised of one member from each of the learning groups associated with the respective WPs (1-5). Through a series of workshops, the aim is to discuss, analyze and decide upon the effectiveness of various tools (policy, strategies, regulatory instruments, etc.) in shifting the behavioral patterns of participants in sport and outdoor recreation.

Thus, WP6 aims to explore ways to achieve future change in the sport and outdoor recreation sectors in an environmentally sustainable manner.

The following questions provide the fodder, which drives WP6.

- a) How can the behavior and other practices of participants in sport and outdoor recreation be understood, contextualized, specified and evaluated, especially in light of the digital turn of society? How can these behaviors and practices shift in order to enhance sustainability in the sport and outdoor recreation sector and what are the expected effects and consequences of these eventual changes?
- b) How can the environmental responsible delivery and consumption of products relating to practices in sports and outdoor recreation encourage a broad-ranging embrace of environmentally-friendly activities in everyday life? In other words, can sustainable outdoor recreation and sporting activities nudge members of the public, businesses, and other stakeholders (e.g., non-profit organizations and municipal institutions) to behave in a more environmentally sustainable manner and, if so, how can this be achieved?
- c) How might we understand, and ultimately best choose, between different sets of complex actions (i.e., policies, regulatory instruments, business strategies) geared towards reducing the negative environmental

repercussions of the sport and outdoor recreation sector? How can these identified actions be improved and implemented over Phase 2 of this project in order to maximize their effectiveness?

Following a series of discussions with the key stakeholders involved in the co-creation process as well as the leaders of the respective WPs 1-5, the major challenge that has been identified in relation to WP6 is as follows:

How can coordinated efforts be made leading to more streamlined decision-making to enhance the environmental sustainability within the sport and outdoor recreation sectors?

- What combination of policies, strategies, tools and practices can most effectively lead to a society-wide movement that embraces environmentally sustainable sport and outdoor recreation?
- How can the sport and outdoor recreation sectors guide consumers, businesses and organizations to embrace a more sustainable behavior?

This challenge (and its associated two sub-challenges) are important in terms of determining the method by which the overriding objective of WP6 will be achieved.

Conceptual framework

The underlying foundation of the conceptual framework of WP6 is to link the past and present with the future in sustainable sport and outdoor recreation. This includes drawing from the findings in WP1 where the emphasis is on historical forces that have formulated through time Swedish policymaking and the population's behavior in terms of practices in the outdoor recreation and sports sectors. These forces are, largely, path dependent and, thus, it is a key aim of WP6 to identify a route toward escaping this path dependency (Dredge, 2001). This necessitates, among others, the development and applications of environmental policy theories (Baumol and Oates, 1988) as well as assessments of existing governance structures and an identification of new arrangements given the complexity, which characterizes the policy arena of the sport and outdoor recreation sectors (Baggio, Scott & Cooper, 2010). The aim is to eventually identify a combination of policies, strategies and tools leading to environmentally friendly behavior and practices in the sports and outdoor recreation sectors. Despite several such initiatives we know little about their effectiveness in leading to a broad perspective of sustainability, or how they are perceived. Further, we shall seek to flesh out the interrelationships of policymaking and pro-environmental behavior. A key question is how can policymakers influence behavioral change when it

comes to the sport and outdoor recreation sectors (Lucas et al. 2008; Truelove et al. 2016)?

Changing behavior and practices relates to an extent to digital aspects since characteristics such as awareness, beliefs and values depend increasingly on information technologies. Despite the growing usage of social media and mobile applications (Hausmann, et al., 2017; Elmahdy, et al., 2017), the implications of information technology for sustainability are poorly understood (Gössling, 2017). One finding related to sustainable solutions in the sports and outdoor recreation sectors is that sustainability is “a very important factor in the design of e-tourism applications, because of linkages to location-based services, destination management systems, carbon calculators, virtual reality technologies, wireless technologies, intelligent transportation systems, social media, augmented reality and recommender systems.” (Scott & Frew, 2013, p. 36).

A key aim of WP6 is to further understand the behavioral trends of participants in sport and outdoor recreation activities with regard to the environment. There are varying disciplinary approaches to studying and understanding behavior, ranging from psychology to sociology, political science and economics. Each of these disciplines has its own theoretical and methodological tools for investigating behavior and behavioral change. Because of the complexity of the task at hand, the theoretical direction should be guided by the evaluation of existing policies in theme 6, outcomes from the other WPs, as well as the challenges studied by the learning groups (starting early 2021). Rather than arbitrarily select one disciplinary approach to investigate environmental behavior at this point, we will use the next year (2021) to better understand the program’s needs in relation to this topic. Not only does the approach we settle on have to match the specific needs of WP6 but also, because of this theme’s integrative nature, it must dovetail with those of the rest of the WPs.

Empirical material and methods

Time is a vital dimension for understanding and analyzing why the sport and outdoor recreation sectors have evolved in the manner they have in Swedish society. WP6 plans to work with WP1 to gain a solid understanding of the path dependent forces that have shaped sport and outdoor recreation in Sweden in order to flesh out future approaches that will enable the sector to become more environmentally sustainable. A fundamental aim is to utilize the co-creation process with the project’s key stakeholders while collaborating with a dedicated learning group, which shall be comprised of one member from each of the

respective learning groups associated with WPs 1-5. This will allow us to identify new governance structures and a policy framework while also influencing the practices of the diverse businesses that serve outdoor and sport activities. Ultimately, this approach will enable us to pave the way towards a nationwide movement that will result in an environmentally sustainable sport and outdoor recreation sector.

Already, a close dialogue with stakeholders involved in the co-creation process as well as the participants in each of the other WPs (1-5) has led us to identify the key challenges associated with the project overall but also this specific WP. To address the main research questions of WP6 while bearing in mind its specific challenge, the following steps are proposed:

1. Undertake a “mapping” of the complex framework that relates to policies, strategies and tools that either directly or indirectly influence the Swedish sport and outdoor recreation sectors. This will enable us, among others, to identify contradictions/obstacles, which stand in the way of effectively moving toward an environmentally sustainable sport and outdoor sector.
2. Conduct a literature review to better comprehend the varying disciplinary approaches to analyze environmental behavior in relation to sport and outdoor activities. Based on this, and the needs and respective competences of participants in the other WPs, a theoretical and methodological direction will be decided by the end of 2021. This will also guide whom to hire as post-doc in the behavioral sciences for years 3 and 4 of the project.
3. Draw from the methodological approach referred to as developmental evaluation. Developmental evaluation represents some of the newest thinking in the field of evaluation and policy studies. It is specifically designed to understand social change process under conditions of complexity (Patton, 2010). Developmental evaluation places emphasis on understanding how policy systems work, and what is needed for new programs, policies and/or practices to succeed, rather than simply focusing on making judgements about whether such interventions succeed or fail. In other words, the evaluative inquiry is used to help improve the design of program, policies, and practices in order to increase the likelihood of success.
4. Together with the dedicated learning group for WP6 and the key stakeholders, inform and design “futuring exercises” (i.e., scenario planning) that encompass the past, present and future of the sports and outdoor recreation sector (Gössling & Scott, 2012; Moriarty, 2012). The

idea is to collaborate and formulate desired futures in order to understand key changes that must occur while also identifying obstacles that may hinder these from taking place.

5. The mapping and literature review mentioned above will allow us to decide on an approach to investigate the environmental behavior of participants in sport and outdoor recreation. Subsequently we plan to conduct one or more of the following tasks:
 - a. Gauge attitudes towards the embrace of aspects of the circular economy in relation to sporting or outdoor recreation activities.
 - b. Determine how participants in the sport and outdoor sectors reason about their behavior in choosing more environmentally friendly alternatives.
 - c. Identify what tools work most effectively to enable businesses and organizations to act more environmentally friendly in sport and outdoor recreation.

Expected findings and contribution to new knowledge

- Improve nationwide governance structures, policies, strategies, tools and practices that will shift the Swedish sport and outdoor recreation sectors towards a greater degree of environmental sustainability.
- Gain a superior understanding of the way in which participant (and spectators where applicable), but also providers (i.e., companies, organizations and clubs), transform their attitudes and behavior when it comes to sport and outdoor recreation activities, to adopt more environmentally-friendly practices

References (selected)

Aall, C., et al. (2011). Leisure and sustainable development in Norway: part of the solution and the problem. *Leisure Studies*, 30(4), 453-476. • Aalto, H.E. & Ernstson, H. (2017). Of plants, high lines and horses: Civic groups and designers in the relational articulation of values of urban natures. *Landscape and Urban Planning*, 157, 309-321. • Agyeman, J. & Evans, B. (2004). 'Just sustainability': the emerging discourse of environmental justice in Britain? *The Geographic Journal*, 170(2), 155-164. • Andersson, T.D., Armbrecht, J., & Lundberg, E. (2016). Triple impact assessments of the 2013 European athletics indoor championship in Gothenburg. *Scandinavian Journal of Hospitality and Tourism*, 16(2), 158-179. • Annerstedt, C. & Lindgren, E.-C. (2014). Caring as an important foundation in coaching for social sustainability: a case study of a successful Swedish coach in high performance sport. *Reflective Practice*, 15(1), 27-39. • Antrop, M. & Van Eetvelde, V. (2017). *Landscape perspectives: The holistic nature of*

landscape. Dordrecht: Springer. • Arnberg, E. (2016). Förstudie SPORTMISTRA - Ett forskningsprogram om åtgärder för att minska miljöpåverkan från idrott och friluftsliv. Stockholm: MISTRA. • Backman, E. (2010). *Friluftsliv in Swedish Physical Education – a Struggle of Values: Educational and Sociological Perspectives*. Dissertation. Stockholm: Stockholms Universitet. • Baggio, R., Scott, N. & Cooper, C. (2010). Improving tourism destination governance: a complexity science approach. *Tourism Review*, 65(4), 51-60. • Banister, D. (2008). The sustainable mobility paradigm. *Transport Policy*, 15, 73-80. • Bennett, E.E. & McWhorter, R.R. (2019). Social Movement Learning and Social Innovation: Empathy, Agency, and the Design of Solutions to Unmet Social Needs. *Advances in Developing Human Resources*, 21(2), 224–249. • Bernstein, B. (1990). *The Structuring of Pedagogic Discourse*. (Vol. 4, Class, Codes and Control). London: Routledge. • Bernstein, B. (2000). *Pedagogy, symbolic control and identity. Theory, research, critique*. (Vol. 5, Class, Codes and Control). (Rev. ed.). Lanham: Rowman & Littlefield Publishers Inc. • Boisjoly, G. & El-Geneidy, A. (2017). The insider: A planners' perspective on accessibility. *Journal of Transport Geography*, 64, 33-43. • Boman, M., Fredman, P., Lundmark, L. & Ericsson, G. (2013). Outdoor recreation - a necessity or a luxury? Estimation of Engel curves for Sweden. *Journal of Outdoor Recreation and Tourism*, 3-4, 49-56. • Bonneuil, C. & Fressoz, J.-B. (2016). *The Shock of the Anthropocene: The Earth, History and Us*. Brooklyn, NY: Verso. • Case, R. (2013). *Events and the Environment*. Oxford: Routledge • Casey, A, Goodyear, V.A. & Armour, K.M. (eds.) (2017). *Digital technologies and learning in physical education: pedagogical cases*. Oxford: Routledge. • Casper, J., Pfahl, M. & McSherry, M. (2012). Athletics Department Awareness and Action Regarding the Environment: A Study of NCAA Athletics Department Sustainability Practices. *Journal of Sport Management*, 26, 11-29. • Cervero, R. et al. (2017). *Beyond Mobility. Planning Cities for People and Places*. Washington DC: Island Press. • Coleman, K. & Danks, C. (2016). Service-learning: a tool to create social capital for collaborative natural resource management. *Journal of Environmental Studies and Sciences*, 6, 470-478. • Collins, A., Munday, M. & Roberts, A. (2012). Environmental Consequences of Tourism Consumption at Major Events: An Analysis of the UK Stages of the 2007 Tour de France. *Journal of Travel Research*, 51(5), 577-590. • Council of Europe. (2000). *European Landscape Convention*. Florence, 20.X.2000, ETS 176. • Crutzen, P.J. (2003). The Geology of Mankind. *Nature*, 415(6867), 23. • Curtis, C. & Scheurer, J. (2010). Planning for sustainable accessibility: Developing tool to aid discussion and decision-making. *Progress in Planning*, 74(2), 53-106. • Curtis, C. & Low, N. (2012). *Institutional Barriers to Sustainable Transport*. London: Routledge. • Dahlberg, A., Rodhe, R. & Sandell, K. (2010). National Parks and Environmental Justice: Comparing Access Rights and Ideological Legacies in Three countries. *Conservation and Society*, 8(3), 209-224. • Dauchy, X., Boiteux, V., Rosin, C. & Munoz, J.F. (2012). Relationship between industrial discharges and contamination of raw water resources by perfluorinated compounds. Part I: case study of a fluoropolymer manufacturing plant. *Bulletin of Environmental Contamination and Toxicology*, 89(3), 525-530. • De Valk, J., Landuyt, D., Broekx, S., De Nocker, L. & Vranken, L. (2017). Outdoor recreation in various landscapes: Which site characteristics really matter? *Land Use Policy*, 65, 186-197. • Do, T. 2019. A Review of Scaling Concepts: ReSolve Scaling Workshops Project. SWEDSD report. Available at <http://uu.diva-portal.org/smash/get/diva2:1293459/FULLTEXT01.pdf> • Dolf, M. & Teehan, P. (2014). Reducing the carbon footprint of spectator and team travel at the University of British Columbia's varsity sports events. *Sport Management Review*, 18, 244–255. • Dredge, D. (2001). Local government tourism planning and policy-making in New South Wales: Institutional development and historical legacies. *Current Issues in Tourism*, 4(2-4), 355-380. • Duit, A., Hall, O., Mikusinski, G. & Angelstam, P. (2009). Saving the Woodpeckers: social capital, governance, and policy performance. *Journal of Environment & Development*, 18, 42-61. • Elldér, E. et al. (2018). Proximity changes to what and for whom? Investigating sustainable accessibility change in the Gothenburg city region 1990–2014. *International Journal of Sustainable Transportation*, 12(4), 271-285. • Elmahdy, Y.M., Haukeland, J.V. & Fredman, P. (2017). *Tourism megatrends, a literature review focused*

on nature-based tourism. Norwegian University of Life Sciences, MINA fagrappport 42. 74 pp. • Ennis, C. (ed). (2017). *Routledge handbook of physical education pedagogies*. Abingdon: Routledge. • Fazey, I. et al. (2018). Ten essentials for action-oriented and second order energy transitions, transformations and climate change research. *Energy Research & Social Science*, 40, 54–70. • Fouche, R. (2017). *Game changer - the technoscientific revolution in sports*. Baltimore: Johns Hopkins University Press. • Fredman, P., Boman, M., Lundmark, L. & Mattsson, L. (2012). Economic Values in the Swedish Nature-based Recreation Sector. A synthesis. *Tourism Economics*, 18(4), 903–910. • Fredman, P., Stenseke, M. & Sandell, K. (red.). (2014). *Friluftsliv i förändring: Studier från svenska upplevelselandskap*. Stockholm: Carlssons bokförlag. • Getz, D. (2018). *Event evaluation: Theory and methods for event management and tourism*. Oxford: Goodfellow Publishers Ltd. Getz, D. & Page, S. (2016). *Event Studies: Theory, research and policy for planned events*. Oxford: Routledge. • Gil Solá, A. et al. (2018). Understanding sustainable accessibility in urban planning: Themes of consensus, themes of tension. *Journal of Transport Geography*, 70 (JuKolbne), 1-10. • Glaeser, E., & Kahn, M. (2010). The greenness of cities: Carbon dioxide emissions and urban development. *Journal of Urban Economics*, 67, 404-418. • Godtman Kling, K., Dahlberg, A. & Wall-Reinius, S. (2019). Negotiating Improved Multifunctional Landscape Use: Trails as Facilitators for Collaboration Among Stakeholders. *Sustainability*, 11(13), 1-21. • Godtman Kling, K., Margaryan, L. & Fuchs, M. (2018). (In)equality in the outdoors: gender perspective on recreation and tourism media in the Swedish mountains. *Current Issues in Tourism*, DOI: 10.1080/13683500.2018.1495698. • Goksøyr, M. (2008). *Historien om norsk idrett*. Oslo: Abstrakt Forlag. • Goodyear, L., Barela, E., Jewiss, J. & Usinger, J. (eds.). (2014). *Qualitative inquiry in evaluation: From theory to practice*. (Vol. 29). New York: John Wiley & Sons. • Gössling, S. & Scott, D. (2012). Scenario planning for sustainable tourism: an introduction. *Journal of Sustainable Tourism*, 20(6), 773-778. • Gössling, S. (2017). Tourism, information technologies and sustainability: an exploratory review. *Journal of Sustainable Tourism*, 25(7), 1024-1041. • Grahn, K. (2014). Alternative discourses in the coaching of high performance youth sport: exploring language of sustainability. *Reflective Practice*, 15(1), 40-52. • Hall, C.M. & Page, S.J. (1999). *The geography of tourism and recreation, environment, place and space*. London: Routledge. • Hammitt, W.E., Cole, D.N. & Monz, C.A. (2015). *Wildland recreation: Ecology and management* (3rd ed.). New York: John Wiley & Sons. • Hansen, A.S. (2016). *Understanding recreational landscapes. Developing a knowledge base on outdoor recreation monitoring in Swedish coastal and marine areas*. Doctoral thesis. Gothenburg: University of Gothenburg. • Hansen, R., Stahl Olafsson, A., Van der Jagt, A.P.N., Rall, E. & Pauleit, S. (2017). Planning multifunctional green infrastructure for compact cities: What is the state of practice? *Ecological Indicators*, 96, 99-110. • Hartig, T. & Kahn, P. Jr H. (2016). Living in cities, naturally. *Science*, 352, 938–940. • Hausmann, A. et al. (2017). Social media data can be used to understand tourists' preferences for nature-based experiences in protected areas. *Conservation Letters*, 11(1), 1-10. • Havitz, M. & Dimanche, F. (1999). Leisure involvement revisited: Drive properties and paradoxes. *Journal of Leisure Research*, 31(2), 122-149. • Hedblom, M., Andersson, E. & Borgström, S. (2017). *Flexible land-use and undefined governance: From threats to potentials in peri-urban landscape planning*. *Land Use Policy*, 63, 523–527. • Heinrichs, H. (2013). Sharing Economy: A Potential New Pathway to Sustainability. *Gaia*, 22(4), 228-231. • Holden, E. (2016). *Achieving Sustainable Mobility. Every-day and leisure-time travel in the EU*. London: Routledge. • Hougham R.J., Nutter, M. & Graham, C. (2018). Bridging Natural and Digital Domains: Attitudes, Confidence, and Interest in Using Technology to Learn Outdoors. *Journal of Experiential Education*, 41(2), 154 –169. • Ison, R. (2010). *Systems Practice: How to Act in a Climate Change World*. Dordrecht: Springer. • Jacquemin, L., Pontalier, P-Y. & Sablayrolles, C. (2018). Life cycle assessment (LCA) applied to the process industry: a review. *The International Journal of Life Cycle Assessment*, 17(8):1028-1041. • Johnsson, M. (2018). The innovation facilitator: characteristics and importance for innovation teams. *Journal of International Management*, 6(2), 12-44. • Jordan, T., Andersson, P. & Ringnér, H. (2018). The Spectrum of Responses to Complex Societal Issues: Reflections on Seven Years of Empirical Inquiry.

Integral Review, 9(1), 34-70. • Kolb, A.Y. & Kolb, D.A. (2008). Experiential Learning Theory: A dynamic, holistic approach to management learning, education, and development. In Armstrong, S.J. & Funkami, C. (eds.): *Handbook of Management Learning Education and Development* (pp. 42-68). London: Sage Publications. • Laven, D.N., Wall-Reinius, S. & Fredman, P. (2015). New challenges for managing sustainable tourism in protected areas: an exploratory study of the European landscape convention in Sweden. *Society & Natural Resources*, 28(10), 1126-1143. • Lehner, M., Mont, O. & Heiskanen, E. (2016). Nudging – A promising tool for sustainable consumption behaviour? *Journal of Cleaner Production*, 134(A), 166-177. • Lennon, M. (2015). Green infrastructure and planning policy: a critical assessment. *Local Environment*, 20, 957-980. • Määttä-Juntunen, H. et al. (2011). Using GIS tools to estimate CO2 emissions related to the accessibility of large retail stores in the Oulu region, Finland. *Journal of Transport Geography*, 19, 346-354. • Martin, C.J. (2016). The sharing economy: A pathway to sustainability or a nightmarish form of neoliberal capitalism? *Ecological Economics*, 121, 149–159. • McCullough, B.P., Bergsgard, N.A., Collins, A., Muhar, A. & Tyrväinen, L. (2018). The Impact of Sport and Outdoor Recreation (Friluftsliv) on the Natural Environment. Background paper. Stockholm: MISTRA. • McCullough, B.P., Pfahl, M. & Nguyen, S. (2016). The green waves of environmental sustainability in sport. *Sport in Society: Cultures, Commerce, Media, Politics*, 19(7), 1040–1065. • Mikaelis, J. (2017). *(Re)conceptualising friluftsliv in the Swedish physical education and health curriculum*. Doctoral Thesis. Stockholm: Gymnastik- och idrottshögskolan. • Moore, A. (2012). Following from the front: theorizing deliberative facilitation. *Critical Policy Studies*, 6(2), 146–162. • Moore, J. (2005). Is Higher Education Ready for Transformative Learning? A Question Explored in the Study of Sustainability. *Journal of Transformative Education*, 3(1), 76–91. • Moriarty, J.P. (2012). Theorising scenario analysis to improve future perspective planning in tourism. *Journal of Sustainable Tourism*, 20(6), 779-800. • Nasir, M.H.A., Genovese, A., Acquaye, A.A., Koh, S.C.L. & Yamoah, F. (2017). Comparing linear and circular supply chains: A case study from the construction industry. *International Journal of Production Economics*, 183, 443-457. • Newman, P. & Kenworthy, J. (2015). *The end of automobile dependence. How cities are moving beyond car-based planning*. Washington DC: Island Press. • Newsome, D., Moore, S.A. & Dowling, R.K. (2012). *Natural area tourism: Ecology, impacts and management* (2nd ed.). Bristol: Channel View. • North, D. (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge University Press. • O’Connell, T.S., & Dymont, J.E. (2016). “I’m just not that comfortable with technology”: Student perceptions of and preferences for Web 2.0 technologies in reflective journals. *Journal of Further and Higher Education*, 40, 392-411. • Øian, H., Fredman, P., Sandell, K., Sæþórsdóttir, A.D., Tyrväinen, L. & Jensen, F.S. (2018). *Tourism, nature and sustainability: A review of policy instruments in the Nordic countries*. Nordic Council of Ministers, TemaNord, 2018:534, Copenhagen, 99 p. • Ottoson, J.M. & Hawe, P. (2009). *Knowledge utilization, diffusion, implementation, transfer, and translation: implications for evaluation*. San Francisco: Wiley. • Patton, M.Q. (2008). *Utilization-focused evaluation* (4th ed.). London: Sage publications. • Pearce, P. & Lee, U. (2005). Developing the travel career approach to tourist motivation. *Journal of Travel Research*, 43(3), 226-237. • Petersson-Forsberg, L. (2014). Swedish spatial planning: A blunt instrument for the protection of outdoor recreation. *Journal of Outdoor Recreation*, 5-6(April), 37-47. • Pierson, P. (2000). Increasing Returns, Path Dependence, and the Study of Politics. *The American Political Science Review*, 94(2):251-267. • Ritchey, T. (2011). *Wicked Problems – Social Messes: Decision Support Modelling with Morphological Analysis*. Berlin: Springer. • Rittel, H.W.J. & Webber, M.M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4, 155–169. • Roy, P., et al. (2009). A review of life cycle assessment (LCA) on some food products. *Journal of food engineering*, 90(1):1-10. • Rutt, R.L. & Gulsrud, N.M. (2016). Green justice in the city: A new agenda for urban green space research in Europe. *Urban Forestry & Urban Greening*, 19, 123–127. • Sandell, K. (2016). Ecostrategies: Presentation and Elaboration of a Conceptual Framework of Landscape Perspectives. *Tourism*, 64(1), 63-80. • Schot, J. (2016). Confronting the Second Deep Transition through the Historical Imagination. *Technology and*

Culture, 57(2), 445-456. • Schwanen, T. (2016). Geographies of transport I: Reinventing a field? *Progress in Human Geography*, 40(1), 126-137. • Scoones, I., Leach, M. & Newell, P. (eds.) (2015). *The politics of green transformations*. Abingdon, Oxon: Routledge. • Scott, W. & Gough, S. (2003). *Sustainable development and learning – Framing the issues*. Baskerville: Book Now Ltd. • Shipway, R., & Jones, I. (2008). The great suburban Everest: An 'insiders' perspective on experiences at the 2007 Flora London Marathon. *Journal of Sport and Tourism*, 13(1), 61-77. • Shove, E. & M. Pantzar (2005). Consumers, Producers and Practices: Understanding the invention and reinvention of Nordic walking. *Journal of Consumer Culture*, 5(1), 43-64. • Slätmo, E., Nilsson, K. & Turunen, E. (2019). Implementing Green Infrastructure in Spatial Planning in Europe. *Land*, 8(4), 62. • SLIM (2004). Developing Conducive and Enabling Policies for Concerted Action. SLIM Policy Briefing No. 5. SLIM Available at <http://slim.open.ac.uk/objects/public/slimpb7final.pdf>. • Stebbins, R. (2001). Serious leisure. *Society*, 38(4), 53-57. • Stebbins, R. (2006). *Serious Leisure: A Perspective for Our Time*. Somerset, N.J.: Aldine Transaction Publications. • Stenseke, M., Lindborg, R., Dahlberg, A. & Slätmo, E. (2012). System or arena? Conceptual concerns around the analysis of landscape dynamics. In Plieninger, T. & Bieling, C. (eds.): *Resilience and the cultural landscape: Understanding and managing change in human-shaped environments* (pp. 80-94). Cambridge University Press. • Steyaert, P. & Jiggins, J. (2007). Governance of complex environmental situations through social learning: a synthesis of SLIM's lessons for research, policy and practice. *Environmental Science & Policy*, 10, 575-586. • Svensson, D., Sörlin, S. & Wormbs, N. (2016). The movement heritage – scale, place, and pathscapes in Anthropocene tourism. In Gren, M. & Huijbens, E. (eds.): *Tourism and the Anthropocene* (pp. 131-151). London: Routledge. • Thaler, R.H. & Sunstein, C.R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. New Haven, C.T.: Yale University Press. • Torbert, B. (2004). *Action Inquiry: The secret of timely and transforming leadership*. San Francisco: Berrett-Koehler. • Turner, M.D. (2016). Political ecology III: The commons and commoning. *Progress in Human Geography*, 41(6), 795-802. • Voss, J-P., Bauknecht, D. & Kemp, R. (2006). *Reflexive Governance for Sustainable Development*. Cheltenham: Edward Elgar. • Walker, G. (2009). Beyond distribution and proximity: Exploring the multiple spatialities of environmental justice. *Antipode*, 41, 614-636. • Wallace-Wells, D. (2019). *The Uninhabitable Earth: Life After Warming*. New York: Random House. • Wall-Reinius, S., Prince, S. & Dahlberg, A. (2019). Everyday life in a magnificent landscape: Making sense of the nature/culture dichotomy in the mountains of Jämtland, Sweden. *Environment and Planning E: Nature and Space*. 2(1), 3-22. • Warde, P., Robin, L. & Sörlin, S. (2018). *The Environment – A history of the idea*. Baltimore & London: Johns Hopkins University Press. • Westin, M., Calderon, C. & Hellquist, A. (2016). *Att leda samverkan – en handbok för dig som vill hantera komplexa samhällsutmaningar*. Lund: Media-Tryck. • Wheeler, K. & Nauright, J. (2006). A Global Perspective on the Environmental Impact of Golf. *Sport in Society*, 9(3), 427-443. • Wolf-Watz, D. (2014). Traveling for nature? On the paradox of environmental awareness and travel for nature experiences, *Tourism*, 62(1), 5-18. • Wondolleck, J.M. & Yaffee, S.L. (2000). *Making collaboration work: lessons from innovation in natural resource management*. Washington, D.C.: Island Press. • Wrisberg, N. et al., (2012). *Analytical tools for environmental design and management in a systems perspective: the combined use of analytical tools*. Vol. 10. Springer Science & Business Media. • Zachrisson, A. & Lindahl, K.B. (2013). Conflict resolution through collaboration: preconditions and limitations in forest and nature conservation controversies. *Forest Policy and Economics*, 33, 39-46.

Mistra Sport & Outdoors
Rapport 2020:1
ISBN: 978-91-88947-87-1