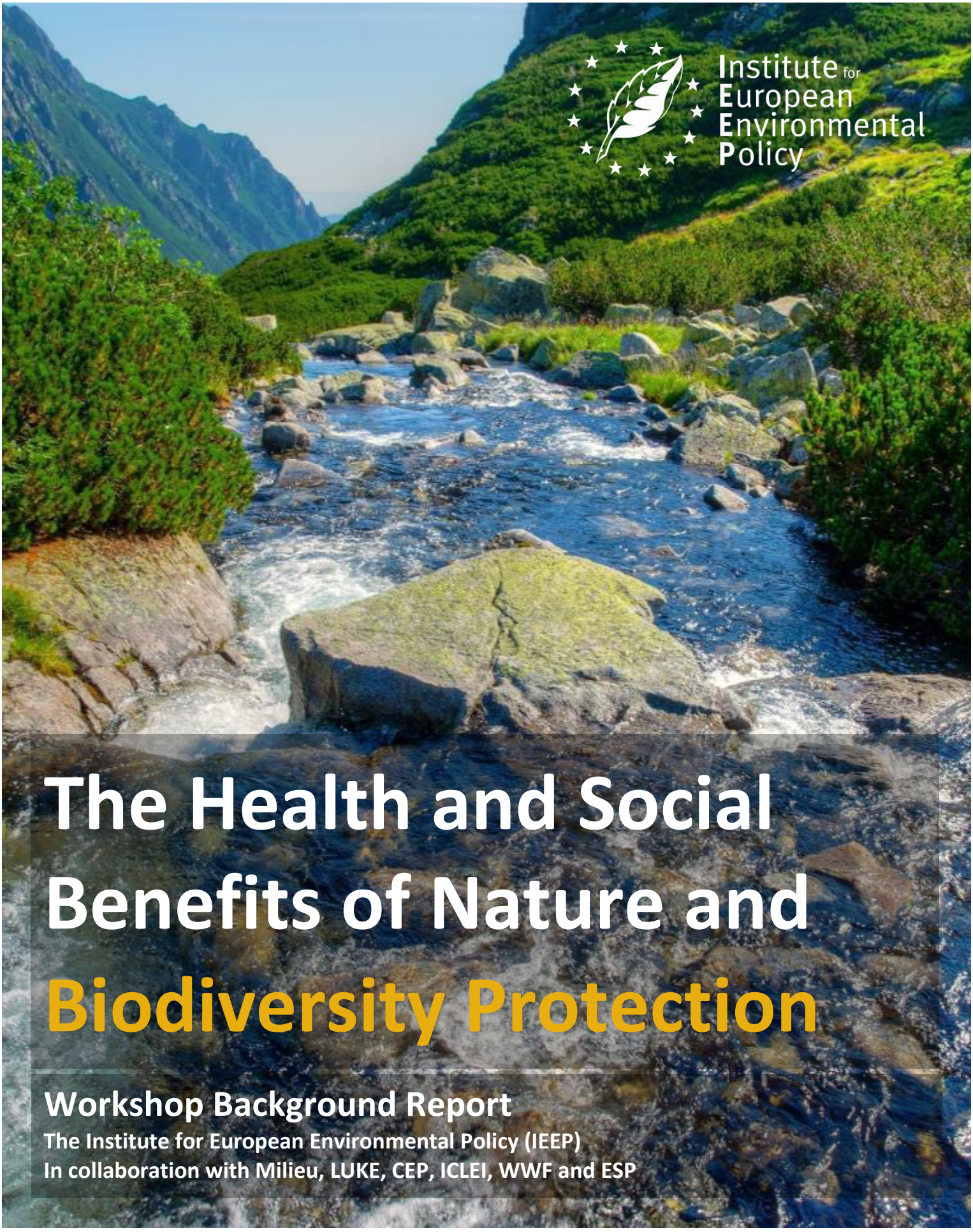

The Health and Social Benefits of Nature and Biodiversity Protection

Workshop Background Report

The Institute for European Environmental Policy (IEEP)
In collaboration with Milieu, LUKE, CEP, ICLEI, WWF and ESP

A project funded by the European Commission (ENV.B.3/ETU/2014/0039) and workshop hosted by the Committee of the Regions

Cite this report: IEEP, Collingwood Environmental Planning, ESP, ICLEI, Luke, Milieu and WWF (2016) The Health and Social Benefits of Nature and Biodiversity Protection – background report for a workshop by the European Commission (ENV.B.3/ETU/2014/0039) and hosted by the Committee of the Regions (27-28 January 2016), Institute for European Environmental Policy, London / Brussels.

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The Health and Social Benefits of Nature and Biodiversity Protection

Workshop Background Report

The Health and Social Benefits of Nature and Biodiversity Protection

Health and Social Challenges in Europe and the Role of Nature

European society faces a growing range of health and social problems. Heat stress in an increasingly urbanized society is a growing risk, exacerbated by urbanisation and climate change. Respiratory diseases from air pollution, thought by some as yesterday's problem, continue to affect European cities. Noise is now also recognised as a major environmental health challenge. Obesity and related diseases, such as Type-2 diabetes, are on the rise. With an aging population and a high-stress environment, various mental health problems such as dementia to burn out are also growing. There is also a growing recognition that many individuals feel isolated and socially excluded in modern society. There is a need for measures to promote social inclusion and cohesion, and to develop a sense of wellbeing, place, and self-esteem.

There are multiple solutions to the complex problems outlined above. This workshop focuses on one solution, historically overlooked, but increasingly recognised as offering an important contribution to the above problems – nature and its health and social benefits.

Over the past decade, numerous studies have shown the multiple benefits of nature to the economy and to human well-being. Examples include carbon storage benefits, water supply and purification, flood management, soil retention, recreation and tourism, and the provision of fish and timber. Only more recently has nature's role in wider health and social benefits, as listed above, come into focus.

This workshop and supporting study explore the potential health and social benefits associated with the protection and enhancement of biodiversity in the EU, and in particular with the Natura 2000 network and wider green infrastructure.

Workshop aims and questions explored

The aim of the workshop is to highlight the positive synergies between nature, human health and social cohesion, to identify best practice, and to discuss how these links might be strengthened and the role that the EU can play in making this happen. The aim is to bring together a new constellation of stakeholders from policy to practice across the health, social and nature communities, from cities and regions to countries and the EU level actors, and develop a road map for a way forward.

The workshop sessions (see Table 1) will include not just presentations from the podium, but a range of short presentations from the floor – so that the depth of insight from practice across Europe can be complemented with new and emerging insights, plans and actions. It will also leave significant space for exploring the workshop questions as outlined in the table below.

Table 1 Health & social benefits of nature protection and biodiversity

Workshop Session	Chapter of the Background report – Study Health Benefits	Questions for the workshop
Welcome and Session 4: Poster session	20 cases presented on posters in the Atrium	• Which case inspired you and what examples do you have from your area of work?
Plenary session	1. Health and social challenges in Europe and the role of nature	• What health and social challenges does society face and what role can nature play in contributing solutions?
Session 2: Health benefits from mitigating air pollution & climate change adaptation	2. Improved air quality & health benefits 3. Improved climatic conditions	• What are the main direct and indirect public health benefits from Natura 2000 and wider green infrastructure in Europe? • What are the main social benefits from Natura 2000 and wider green infrastructure in Europe? • What are good examples of these benefits (and their values) across the EU? • Who has driven this practice? What tools and measures have enabled progress? • To what extent are the experiences replicable and transferable across issues and across Europe?
Session 3: Health benefits from noise reduction and living near nature	4. Noise reduction benefits 5. More pleasant & peaceful, less stressful environment	
Session 5: Health benefits: Wellbeing and exercise – from improved mental health to reduced obesity	6. Healthier lifestyles – nature experience 7. Outdoor recreation and physical activity 8. Wellbeing – living in attractive location	
Session 6: Tackling social inclusion, improved sense of place, engagement & jobs	9. Quality of green public spaces, reduced social tension 10. Opportunities for involvement: employment & volunteers	
Session 7: Policy implications: Natura 2000 and wider green infrastructure	11. Protected areas, green spaces and green measures – solutions for health and social needs	• What Natura 2000 measures (management, restoration) can help to determine, support and promote health and social benefits in particular? • What type of green infrastructure elements and related management measures (e.g. urban green spaces) can help to determine, support and promote health and social benefits in particular?
Session 8: Governance solutions and integration	12. Governance insights	• Which stakeholders are building on the health and social benefits of interacting with nature? • What governance structures and policy frameworks are helping to determine and drive progress on nature-health-social benefits? • What are the key barriers that limit stakeholders in initiating or implementing initiatives or projects building on the health and social benefits of nature and biodiversity? • What is needed to ensure (better) involvement from stakeholders from the health sector? • How can the EU (through policies and funding instruments) support cross-sectoral collaborations among health/social/nature stakeholders?
Session 9: Developing a road map (break-out sessions) **Session 10:** Closing plenary: Health-social-nature synergies & road map for a way forward	13. Developing a road map	• How can we build on the benefits from the nature-health-social synergies? • What more can be done by whom in order to improve knowledge, communication, stakeholder cooperation and governance, implementation and investment?

1 IMPROVED CLIMATIC CONDITIONS – MITIGATING HEAT STRESS

What is the problem?

Heat stress occurs when extreme temperatures overcome the body's natural cooling system. **Risks include exhaustion, heat stroke and mortality** (Kovats, et al. 1999). **Europe's 2003 heat wave caused up to 70,000 deaths** over four months (EEA 2012a). Heat stress is exacerbated by the urban heat island effect (UHI) (Watkins, Palmer, & Kolokotroni, 2007). In Europe, **UHIs can increase urban temperatures by up to 12°C** compared to non-urban areas (Depietri, Renaud, & Kallis, 2011).

Climate projections suggest that the risk of heat stress will increase in the future. Around 75% of Europeans live in urban areas, which will be exposed to rising average and extreme temperatures from climate change (EEA 2012a). Several assessments conclude an increase of heat-related mortality across Europe (EEA 2012b). For example, the ClimateCost project concluded an additional 127,000 deaths per year in the 2080s across Europe without climate adaptation activities and of 40,000 deaths per year with adaptation activities.

Heat stress can affect economic productivity (Lancet Commission, 2015). Hubler et al. (2007) assess that heat-induced output losses in Germany could amount to 0.1%–0.5% of GDP or €2.5–10.4 billion per annum by the end of the 21st century. **The risks are unequally distributed according to geographic and social factors**. Age, gender and income can determine vulnerability. In France, during the 2003 heatwave, mortality rates doubled in the most deprived cantons (Rey et al., 2009).

Can nature help? What does the evidence say?

Nature can help to reduce the risks associated with heat stress by providing cooling, from shade and evapotranspiration (Ennos, 2012). The magnitude of cooling is dependent on the configuration, type, size, health and density of vegetation (Zupancic, Westmacott, & Bulthuis, 2015). Seasonal and temporal variations may also influence the cooling capacity of vegetation (Renaud & Rebetez, 2009).

Large parks and protected areas make significant contributions to cooling and provide oases on hot days (Bowler, Buyung-Ali, Knight, & Pullin, 2010). The cooling effect of parks may extend to the wider surrounding area. A study of three parks in Goteborg, Sweden, showed cooling effects could reach as far as 1 km from the boundary of the largest park considered (156 ha) (Upmanis et al., 1998). Small parks also offer relief on hot days. Air temperatures in the Teofilo de Braga garden (0.24 ha), Lisbon, were up to 6.9°C cooler than the surrounding area (Oliveira et al., 2011).

Tree planting campaigns in European cities are often motivated by their cooling benefits. The city authorities in Berlin aim to plant 10,000 new trees by 2017 (Senatsverwaltung für Stadtentwicklung und Umwelt, 2015). A study in Manchester, UK showed that an **increase of green areas by 10% would keep the maximum temperatures by 2080 at nearly the same level as 1961–1990 baseline conditions** and mitigate an expected temperature rise of 4°C (Gill et al., 2007).

Does it work in practice? A case example: Berges du Rhône, Lyon, France

The heat wave in 2003 increased mortality in Lyon by 80%, above the average for a French city. The Rhône River, which runs through the city, has been at the heart of the solution. **Climate adaptation plans for Lyon aim to increase access to cool and shaded areas**. In 2007, the city reopened access to the banks of the river. The **EUR 42 million redevelopment programme, Berges du Rhône, replaces asphalt with 5km of riverside path way and green spaces** (Grand Lyon, 2014). In addition, riverside redevelopments aim to provide 25,000 new homes and **14,000 new jobs by 2030**.

2 IMPROVED AIR QUALITY & HEALTH BENEFITS

What is the problem?

Air pollution has both health and social consequences. Pollutants, such as particulate matter, ozone, and nitrogen dioxide, affect human health, ecosystems, climate and the built environment. **Air pollution is the largest environmental health risk in Europe**. The EEA (2015a) estimates that poor air quality was responsible for more than **400,000 deaths in the EU-28 in 2012**. From 2011–2013, in excess of 75% of the urban populations in the EU-28 were exposed to harmful levels of $PM_{2.5}$, PM_{10}, O_3, and BaP, as defined by the WHO (2015a). Risks are particularly linked to cardiovascular, cerebrovascular and respiratory disease. The health impacts of air quality are particularly acute in urban areas and have considerable economic impacts – increasing mortality, increasing medical expenditure, and reducing productivity. WHO Europe estimate that the **annual economic burden of the health impact of air pollution is in excess of EUR 1 trillion**.

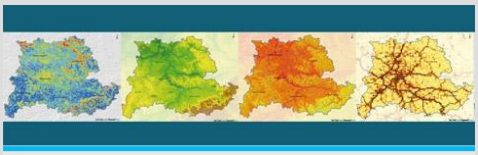
Can nature help? What does the evidence say?

Air pollution can be controlled in a number of ways: reducing the emission of pollutants, increasing the dispersion of pollutants, providing sinks for pollutants, and reducing personal exposure by avoiding polluted areas. **Nature can contribute both directly and indirectly to these pathways to control pollutants**. Air pollution also directly influences the health of vegetation and ecosystems (Pugh, MacKenzie, Whyatt, & Hewitt, 2012).

Green infrastructure has a natural capacity to directly act as a barrier and remove air pollutants from the atmosphere through gaseous absorption or dry deposition. A number of variables, such as the type of vegetation, its location, and interaction with other variables, such as airflows, determine the role of vegetation as a sink for pollutants. Carefully designed **green infrastructure, such as tree lined street canyons and green walls can positively influence pollutant exposure** (Currie & Bass, 2008; Pugh, MacKenzie, Whyatt, & Hewitt, 2012).

Nature can indirectly reduce air pollution and its impacts. Firstly, green infrastructure, such as green corridors, can **promote emissions reductions through behavioural change**, for example by facilitating beneficial mobility choices such as cycling (ECF, 2014; EEA, 2015b). Secondly, green infrastructure, particularly parks and protected areas such as Natura 2000; **provide valuable oases where air quality is significantly better than surrounding areas**. Access allows individuals to reduce their personal exposure to pollutants, even though surrounding ambient levels may be poor. Thirdly, the cooling effect of vegetation, through providing shade and evapotranspiration, **can help to generate airflows, which disperse pollutants** reducing their relative concentrations.

A case example: Stuttgart KlimaAtlas



Klimaatlas Region Stuttgart

Historically poor air quality in Stuttgart, due to industry and local geography, gave rise to a **response based on mapping and green infrastructure** (Baden-Württemberg, 2012, 2015). In 2008, the Region of Stuttgart developed **KlimaAtlas to map air pollution, wind and climate, as well as urban morphology**. The software was used to support a **green infrastructure strategy and new planning legislation** which prompted an **increase in green space to 60%,** the **greening of 300,000 m^2 of rooftops**, and the greening of tram tracks (WWF, 2012). The city is zoned in order to generate clean airflows from the surrounding countryside. At least 39% of the city is under nature conservation.

3 NOISE AND HUMAN HEALTH

What is the problem?

Exposure to excessive noise is considered the second-worst environmental cause of ill health after air pollution (WHO, 2011). In Europe, road traffic is the number one cause of environmental noise (noise pollution). The World Health Organisation (WHO) estimates that **40% of the population in EU countries is exposed to road traffic noise at levels exceeding 55 db(A)[1].** More specifically, 20% of the population in the EU is exposed to levels exceeding 65 dB(A) during the daytime and more than 30% of the EU population is exposed to levels exceeding 55 dB(A) at night.

Noise can result in both auditory and non-auditory effects. Auditory effects mainly include **hearing impairment and tinnitus**. Hearing loss can be caused by a one-time intense noise event or long-term exposure with sound pressure levels higher than 75–85 dB, which can occur, for example, in industrial settings (Basner et al., 2014). The main non-auditory effects consist of **annoyance, sleep disturbance, stress, hypertension and cardiovascular** diseases (e.g. coronary heart disease and strokes), as well as impaired cognitive development of children (Basner et al., 2014; EEA, 2014; Floud, Blangiardo, Clark et al. 2013; Hansell et al. 2013; Hygge at al. 2002; Muntzel et al. 2014; Pujol et al., 2014; Van Kempen, Babisch 2012; Stansfeld et al., 2005). For western European countries, the WHO estimates that **one million healthy life years (HLY) are lost per year due to traffic noise.** More specifically, these include 61,000 HLY lost due to heart disease, 45,000 HLY related to cognitive development, and 903,000 HLY from sleep disturbance (WHO, 2011).

Can nature help? What does the evidence say?

The **health benefits of living on the quiet side in urban dwellings –** quiet façades or quiet courtyards – have been studied extensively, as well as **the relationship between noise annoyance and adverse health effects.** Access to a quiet side, including green spaces, can help to reduce annoyance and concentration problems. Having a bedroom located on a quiet side can reduce noise annoyance and noise induced sleep disturbances (Boding et al., 2015; van Renterghem & Botteldooren, 2012a).

Vegetation can impede noise propagation by absorbing or diffracting noise. Trees can function as obstacles placed within sound waves (distance between the source and receiver of sound) to reduce noise. The trunks, branches and foliage of trees can scatter the sound, which will reduce the sound level once it reaches the receiver (Van Renterghem, 2015).

The presence of green areas also influences noise perception and can have a positive impact on people's mental health. A survey carried out in Sweden in an urban residential neighbourhood with high road-traffic noise exposure concluded that the **presence of green areas reduced long-term noise annoyances and the prevalence of stress-related psychosocial symptoms** (Gidlof-Gunnarsson & Ohrstrom, 2007).

Looking at the types of green areas and vegetation, studies have shown that tree belts and earth berms can be relatively effective in reducing road traffic if they are well designed (Hosanna, 2013; Van Renterghem et al., 2012a; Van Renterghem, 2015). For example, trunks and forest floor can reduce noise significantly, which shows the necessity to plant a high density of trees when designing tree belts (Van Renterghem, 2013). **A 15 meter deep tree belt can achieve a reduction up to 6 dB(A) at a distance of 50 m, and a 30 m deep belt up to 10 dB(A)**. Furthermore, a sloped earth berm can achieve similar noise reduction as a noise wall of the same height (Hosanna 2013).

Green roofs also have the potential to reduce the intensity of sound waves over buildings, in particular due to the porous substrate they are made of. Noise reduction is highly influenced by the shape of the roof. **A 10 cm thick vegetated substrate placed on a ridge roof can reduce noise propagation by 7.5 dB(A) over a courtyard**. The same substrate placed on a flat roof will achieve a reduction of traffic noise around 3 dB(A) (Van Renterghem, 2015).

[1] A-weighted decibels refer to loudness of sounds in air and are corrected for audio frequencies.

A case example: Le Parc des Hautes Bruyères France, Villejuif

A former industrial zone in Villejuif (a southern suburb of Paris) was converted in a 23 hectares park. The park is a buffer area located between a highway and a residential area – the park is 600 meter large at its largest point. In particular, a large earth berm (60 m large) along the highway acts as a noise barrier. **The noise level in the park is consequently 20dB lower than at the highway**. A quiet area, so called **silent garden** has also been created in the park at 12 m below the ground level to promote recreation and rest. In this area, **noise levels are 20dB lower** than in the rest of the park. Thanks to the park and the earth berm, **inhabitants located at the east of the park are exposed to noise level below 55dB**.

Beside noise level reductions, the park has additional benefits such as space for recreation and biodiversity. There are sport pitches and a medicinal garden consisting of over 900 plants and 85 species.

4 MORE PLEASANT, PEACEFUL, LESS STRESSFUL ENVIRONMENT

What is the problem?

In 2010, 75% of Europeans lived in cities and urban areas. This is expected to reach 80% by 2020 (European Commission, 2010). While living in urban areas brings benefits such as job opportunities, limited access to green space in cities can directly impact people's health and quality of life.

More pleasant and peaceful, and less stressful green environments can have a positive effect on people's mental health. Mental disorders are common among Europeans: a systematic review, covering 16 European countries, estimated that **27% of the EU adult population (18–64 years) experienced at least one mental disorder** during the last 12 months (Wittchen & Jacobi, 2005).

Can nature help? What does the evidence say?

The presence of nature in living and working environments has been shown to be beneficial in a number of contexts. Benefits can be gained when making active use of nature, but also from the physical presence of nature in the near surroundings (direct health benefits). In the latter case, the distance to and amount of green space plays an important role in how large the health benefits are. Potential direct health benefits from nature include faster recovery from mental fatigue, less stress, better quality of life, and lower risk of mortality (Mallet et al., 2006).

Several experimental studies (Health Council of the Netherlands, 2004, van den Berg et al., 2007, Hartig et al., 1991, Roe et al., 2013) have shown that exposure to nature has a **positive effect on mood, concentration, self-discipline and physiological stress**. A study in the Netherlands examined the role of nature on self-reported health and concluded that **people living in a greener environment experienced less health problems and scored their health more positively compared to people living in less green environments** (de Vries et al., 2003)**.** Another Dutch study focused on the amount of green space inside a one to three kilometre radius of one's living environment (Maas et al., 2006). The study concluded **a positive interaction between the amounts of green space in people's living environment and their self-reported general health**.

Lower mortality rates have also been associated with a reduced distance to green areas in people's living environment (Maas et al. 2009; Mitchel & Popham, 2008; Takano et al. 2002). The Scottish Government (2014) conducted a study on the relationship between the amount of green space in relatively deprived urban areas and mortality rates. The study showed that **middle-aged men living in deprived urban areas with high amounts of green space have a 16% lower risk of dying** compared to the same age group living in areas with lower amounts of green space.

Finally, having green infrastructures and nature in people's direct living environment has also been linked to a decreased prevalence of allergies. Various studies suggest that **growing up and living in microbe-rich environments can reduce the development of allergies** (Björksten et al., 2004; Ege et al., 2011; Haahtela et al., 2013; Hanski et al. 2012; Kabesch et al., 2004). Researchers argue that exposure to certain microorganism such as those present in green environments can positively influence the human immune response (e.g. reduced prevalence of hay fever).

Hence, research indicates that the presence of natural spaces and biodiversity in living environments promotes healthier and happier lives; however, there is still a lack of robust evidence to demonstrate the health pathways and associations.

A case example: NHS Forest, United Kingdom

NHS Forest – a national project in the UK – created green spaces near healthcare sites. Patients can see the green landscape from their windows and can go outside to walk through the green area. The project aims to improve the health and wellbeing of staff, patients and communities. Studies have shown that people experience improved rest and relaxation and it is believed to benefit rehabilitation and recuperation. The green spaces are seen as part of the healing process, and NHS Forest has therefore developed a guideline for green space design for health and well-being.

5 HEALTHIER LIFESTYLES – NATURE EXPERIENCE

What is the problem?

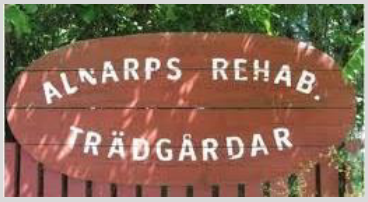
Acute and chronic stress and insufficient recovery from stress is an important public health concern. Prolonged stress is linked to several diseases such as infections, cardiovascular, gastroenterological and immunological diseases, diabetes, depression and aggression (Kivimäki et al., 2002; Wellen, et al., 2005; Nilsson et al., 2011). **Mental disorders alone account for about 20% of the burden of disease in the European Region, rising to 26% in the countries in the European Union (EU). Depression alone is responsible for about 15% of all days lived with disability.** Currently nature areas are not considered a necessity for healthier lifestyles, particularly in urban areas where competition for land is intense. The public health benefits of forests and other nature areas must be better understood and more effectively communicated (Africa et al. 2014).

Can nature help? What does the evidence say?

Being in contact with nature can support health and wellbeing in different periods of life. Nature areas can contribute to children's development – notably to their **concentration, motoric skills, self-esteem, and emotion regulation.** Children with attention deficits concentrate better after walking in the park (Faber Taylor and Kuo, 2009). Furthermore, outdoor time (versus indoor) is related to increased physical activity, reduced sedentary behaviour, and improved cardiorespiratory fitness of children aged 3–12 (Gray et al., 2015). Nature has **restorative, stress reducing effects** and even short break from work in green area can have positive effects of stress reduction. People's mood and positive feelings increase after being in urban green areas (well-constructed urban park and city woodland) compared to city centre (Tyrväinen et al., 2014). Some **evidence** shows that natural environments **lower blood pressure** and **pulse rate** as well as **reduce cortisol level** (e.g. Park et al. 2010; Li, 2010; Horiuchi et al., 2013). Forests and parks are also used for therapeutic interventions.

A case example: Alnarp Rehabilitation Garden, Sweden

The aim of Alnarp Rehabilitation Garden is to pilot the effectiveness of nature based rehabilitation (NBR) on different users groups. Three main groups have been studied: individuals recovering from stress related mental disorders, stroke and war neuroses (e.g. with refugees). Participants having severe stress and/or mild to moderate depression significantly reduce their health care consumption when participating in NBR. One year after rehabilitation, the costs for primary care had dropped by 28% for the intervention group in Alnarp, and in terms of days spent in hospital, they had fallen by 64% (Währborg et al., 2014).



The Skåne region has supported the initiative to start NBR in rural businesses and it now expanded to 11 gardens. This project is financially supported mainly by Region Skåne and the European Social Fund, also by the Swedish Social Insurance Agency, the Federation of Swedish Farmers and the Swedish Public Employment Service. For this project, **1.3 million euros**/year was reserved for the project with a capacity to treat 250 – 300 patients per year.

6 OUTDOOR RECREATION AND PHYSICAL ACTIVITY

What is the problem?

In Europe, low physical activity level is one of the biggest health risks. In many European countries, the national recommendation for children and young people is at least 60 minutes of moderate-to vigorous-intensity physical activity each day, in line with the WHO global recommendation (Kahlmeier et al., 2015). Worldwide, 80% of the 13–15-year-olds and 31% of adults are physically inactive and do not reach the minimum recommended levels (Hallal et al., 2012). Globally, physical inactivity causes approximately three million deaths per year (Lim et al., 2012), as well as 6%-10% of the burden of coronary heart disease, type-2 diabetes, and breast and colon cancers (Lee et al., 2012). As a cause of death, inactivity is considered as a "new smoking" (Lee et al., 2012).

Can nature help? What does the evidence say?

Evidence shows that green exercise (activity in the presence of nature) leads to positive short- and long-term health outcomes. **Exercising and being physically active in green areas provides not only physical health benefits but also positive effects on mental health.** Physical activity in nature in comparison to other environments is related to higher vitality level, diminished negative affects, and general mental health (Thompson et al., 2011). **People want to spend more time exercising in green areas,** so proximity to green areas increases the frequency and duration of physical activities. Outdoor walking is associated with higher levels of enjoyment, and because of that people tend to exercise for longer periods when outdoors (Neuvonen et al., 2007; Focht et al., 2009; Gladwell et al., 2013). Nature areas are attractive environments for physical activities across Europe. The majority of peole taking part in outdoor recreational activties consider natural environments a more attractive activity settings than built up areas. Among natural areas, forests are considered one of the more attractive types of nature, although landscape variation is highly appreciated (Tyrväinen et al., 2005).

A case example: Moved by Nature, Kuopio, Finland

Moved by Nature's aim was to promote collaboration between **nature** and **health sectors** in Finland to allow **vulnerable groups** to benefit from access to **physical activity in natural spaces across Finland.**

The pilot study in Kuopio included men at risk of type 2 diabetes. The eight meetings in total covered different outdoor activities (e.g. canoeing, hiking, horse riding, ice fishing), lifestyle counselling, and healthy food preparation together in nature.

16 men at risk of type-2 diabetes were involved in the pilot and reduced their group weight by 60 kg in total (Kaasalainen et al. 2015). The whole Moved by Nature program was funded by **the European Union Social Fund** (75%) and **public and private organisations**, with a total budget of **348,000** €.

7 WELLBEING – LIVING IN ATTRACTIVE LOCATION

What is the problem?

The quality of the living and working environments make a difference for **both physical and mental health** and well-being of citizens. Low-quality living environments do not offer adequate opportunities for reducing high stress levels or locations for physical activity. Alongside urbanization, more people are confronted with the health and well-being risks of grey living environments, including problems with noise and air pollution.

Can nature help? What does the evidence say?

Biodiverse natural environments promote better health and well-being of urban inhabitants through exposure to pleasant environments and **encouraging outdoor recreation and physical activity** (Lovell et al., 2014). Even short visits to nature increase urban dwellers' positive emotions and the sense of well-being. **Nature should be easily accessible**, so that visits to nature can be incorporated into daily routines. This is particularly important for older people, who tend to report more positive benefits in a natural environment that younger age groups (McMahan & Estes, 2015).

Epidemiological studies have found **long-term beneficial health effects** of green environments on **reduced morbidity and increased longevity** (Maas et al., 2009; Takano et al., 2002). The cross-sectional studies on the topic have found a positive relation between well-being and the amount of neighbourhood greenery (e.g. Van Herzele & de Vries, 2012; Ward Thompson & Aspinall, 2011).

Moreover, living in areas with green spaces is associated with **significantly less income-related health inequality**, weakening the connection between deprivation and health as much as by 40% (Mitchell and Popham, 2008; Mitchell et al., 2015).

Green areas improve the quality of residential and working environments, which is reflected in **property values** (Kellert, 2005; Tyrväinen et al., 2005). For example, a study from the Netherlands reports that the distance to green environment has a price effect as long as the areas are within walking distances from home, which means between 400 meters and 600 meters (Luttik, 2000).

The results reflect the fact that green structures offer valuable aesthetic and recreational services to households. From the residents' perspective the relevant issue is not only the accessibility to nature, but also the **environmental quality and diversity of nature experiences** offered by the everyday living environment (Tyrväinen et al., 2007; Faehnle et al., 2011).

A case example: Chrudim, Czech Republic

Chrudim has been part of the WHO Healthy Cities Project now for more than a decade. It has implemented a wide range of activities and changes, including **investments in green infrastructure**, to promote sustainable living in a healthy city. Chrudim has run a programme of greening to deliver health benefits to its citizens and visitors. Notable activities include investing in **arborists to care for city trees**, developing **new public parks**, **greening housing estates**, and providing residents with new **opportunities for outdoor recreation**. Around 1000 people participate in **voluntary projects** organised by the city each year. Furthermore, Chrudim has a number of ongoing campaigns to promote healthy lifestyles and the links with biodiversity.

Chrudim continues to promote healthy living, for example with its **"Health Plan 2015-2018"**, which aims to address several issues such as active ageing, non-infectious diseases, and reducing alcohol-, drug- and tobacco-related harm. The Health Plan is based on data and statistics on the current health status of the citizens of Chrudim. This is supported by a number of health/biodiversity promoting campaigns ongoing, as the "Days of Health", the "Day of the Earth" and the "Bio-market".

8 QUALITY OF GREEN PUBLIC SPACES, REDUCED SOCIAL TENSION

What is the problem?

Currently 70% of Europe's population live within urban settlements, and urban development is Europe's fastest-growing category of land-use change (EEA, 2015c). Increasingly urban populations in Europe and increased densification can lead to limited access to quality green space for some citizens. **"Access" to a green space is generally defined as having a public green space within 300 m or a 5-minute walk.** Unequal access to quality green space is a factor in social exclusion[2] and social tension, where particular social groups pursue their own values and preferences without consideration, or inclusion, of others. However, **accessibility depends on multiple factor**s, such as gender, age, relative income, and education, and consequently, **social aspects as well as physical proximity determine the accessibility of green space to individuals** (Booth et al., 2010, Kabisch et al., 2015, Wang et al., 2015).

Can nature help? What does the evidence say?

Having access to and using shared, green public spaces and wider green infrastructure can contribute to increased social cohesion and reduced social tension, particularly for minority groups (e.g. ethnic, religious) and the socially excluded (e.g. immigrants, economically deprived) (Keniger et al., 2013).

Greenspaces, including community gardens and forests are an **important factor in community identity**, and can **strengthen people's attachment to their communities**. Research indicates that green infrastructure and accessible green space are important factors in individuals and communities establishing a 'sense of place' and 'ownership' of their local landscape (Maas et al., 2008, English Nature, 2003), and a study in Slovenia identified the importance of urban forests in supporting community identity (Hladnik and Pirnat, 2011).

Greenspaces, parks and playgrounds provide places for formal and informal social interaction, and that this can strengthen communities and **help people from minority groups or different cultural backgrounds become well integrated** in and identify with their community (see e.g. Seeland et al., 2009). Research suggests that seeing one's neighbour at the local park can help to **build familiarity, a sense of commonality, and sets the groundwork for future engagement**, and encourages neighbourhood interaction (Bennet et al., 2012). These interactions, in turn, can lead to increased social cohesion and inclusion: green infrastructure in the form of green public spaces, especially in urban areas, can act as 'green hubs' for communities (Hartig et al., 2014, New Economics Foundation, 2012, Ockenden, 2007, Ecominds, 2013, Swanwick et al. 2003).

The evidence indicates that **the quality and design of green spaces, particularly in urban settings, plays an important role in people's perceptions of access and safety,** and thus influences the extent to which greenspaces may enhance community cohesion and result in social benefits (Arnberger et al., 2012). Visitor density, spatial layout and 'infrastructure' (e.g. signage, benches, play equipment) in green spaces all enhance potential benefits including social interaction, with factors such as the availability of seating and 'shady areas' influencing the extent of social interaction (Bennet et al., 2012).

[2] *"Social exclusion is a complex and multi-dimensional process. It involves the lack or denial of resources, rights, goods and services, and the inability to participate in the normal relationships and activities, available to the majority of people in a society, whether in economic, social, cultural or political arenas. It affects both the quality of life of individuals and the equity and cohesion of society as a whole"*
http://www.poverty.ac.uk/definitions-poverty/social-exclusion

A case example: Urban green to enhance social cohesion, Almada, Portugal

The city of Almada in Portugal acknowledged that effective management of urban green spaces requires the participation of local citizen groups, e.g. to help maintain public green spaces such as urban parks and gardens. In designing these spaces and their maintenance, attention was given to stimulating social integration of different ethnic and cultural groups in green spaces e.g. by providing a varied infrastructure for different recreational activities such as biking, jogging, or practicing yoga or Tai-chi.

A network of community allotment gardens has also been established, in part to promote local production and small-scale commerce, as well as social cohesion by fostering social relationships and helping families budget (by growing their own produce).

9 OPPORTUNITIES FOR EMPLOYMENT & VOLUNTEERS

What is the problem?

Europe's population is becoming increasingly urban, and at the same time diverse. Such changes have been and continue to take place against a backdrop of a policy of economic austerity in many EU countries (see for example ECB, 2008). These trends present challenges for Europe**, often combined with high unemployment, particularly in urban areas. There is a need for new means of individual and community engagement**, and access to the opportunities that engaging with the natural environment can provide.

Can nature help? What does the evidence say?

Engagement in the natural environment such as urban green spaces, woodlands or protected areas **can take various forms, including volunteering, training and employment, communal actions such as through community gardens and allotments and organised eco-therapeutic activities** such as group walks (see e.g. Mind, 2013).

Volunteering in the natural environment can lead to **social and community benefits, enabling people to strengthen existing and develop new social relationships, build a sense of community, and learn new skills**. A recent study of volunteering in the natural environment in the UK found that volunteers reported personal benefits (e.g. improved knowledge) but also social benefits. Among those were e.g. a 'sense of belonging in my community'; 'trust in other people in the community'; 'meeting new people in the community'; and 'fostering a sense of pride and care in the area' (Environment Agency and Forest Research, 2015). The evidence suggests that **volunteering increases social support and reduces social isolation** (Reynolds, 2000), and that **the natural environment provides opportunities for learning and this can enhance people's personal development and self-esteem, promoting** social interactions and connections (Bendt et al., 2013, Natural England, 2013).

Managing and improving natural spaces provides multiple direct opportunities for employment. In addition, further indirect opportunities may be provided from recreation and tourist services. Such opportunities may arise from activities including the maintenance / enhancement of urban, peri-urban, and rural parks, or planting new tree lined roads or developing green-roofs (see for example Forestry Commission, 2013, Edwards et al., 2009). Initiatives to manage and attain community benefits can make use of traditional knowledge (e.g. forest management) and new approaches, skills and tools (e.g. architects, spatial planners, GIS mapping).

The increased recognition and use of the ecosystem services concept has increased interest in social and economic benefits. One study estimated **the total annual revenue linked to visitor spending in national parks and key recreation areas in Finland (a total of 45 areas) to be €87 million per year, generating €10 return for every €1 of public investment** (Huhtala et al., 2010).

A case example: Hoge Kempen National Park, Belgium

The closure of the last coalmines in the province of Limburg left 40,000 unemployed and vast brownfield areas threatened with post-industrial decline, including large wetland lakes left from extraction areas. In 2006, following efforts of the local environmental NGO Regional Landschap Kempen en Maasland (RLKM), the area became Belgium's first national park, covering a number of Natura 2000 sites.

Investments in conservation are based on economic arguments: 400 full-time equivalent jobs (direct and indirect) and direct economic benefits of around 20 MEUR (Van den Bosh, 2012). A total 128 MEUR have been invested in the park, compared to an annual indirect revenue creation of 191 million euros.

10 PROTECTED AREAS, GREEN SPACES – SOLUTIONS FOR HEALTH & SOCIAL NEEDS

The Birds Directive and the Habitats Directive form the main legal framework for the protection of nature and biodiversity in the EU. Together they establish the EU-wide Natura 2000 network of protected areas. Currently the network comprises of 26,000 sites, covering almost 18 per cent of the EU territory (around 790,000 km^2) and includes a growing number of marine protected areas (MPAs) of over 3,000 sites covering over 318,000 km^2. The Natura 2000 network is designed to protect habitats and species of European importance. However, while its primary purpose is biodiversity conservation and sustainable development of activities, the network also provides a range of ecosystem services as co-benefits of biodiversity protection. A range of these benefits is related to health and social wellbeing (see Figure 1). As such, the network is a core element of the wider EU green infrastructure and forms the backbone of European living natural capital.

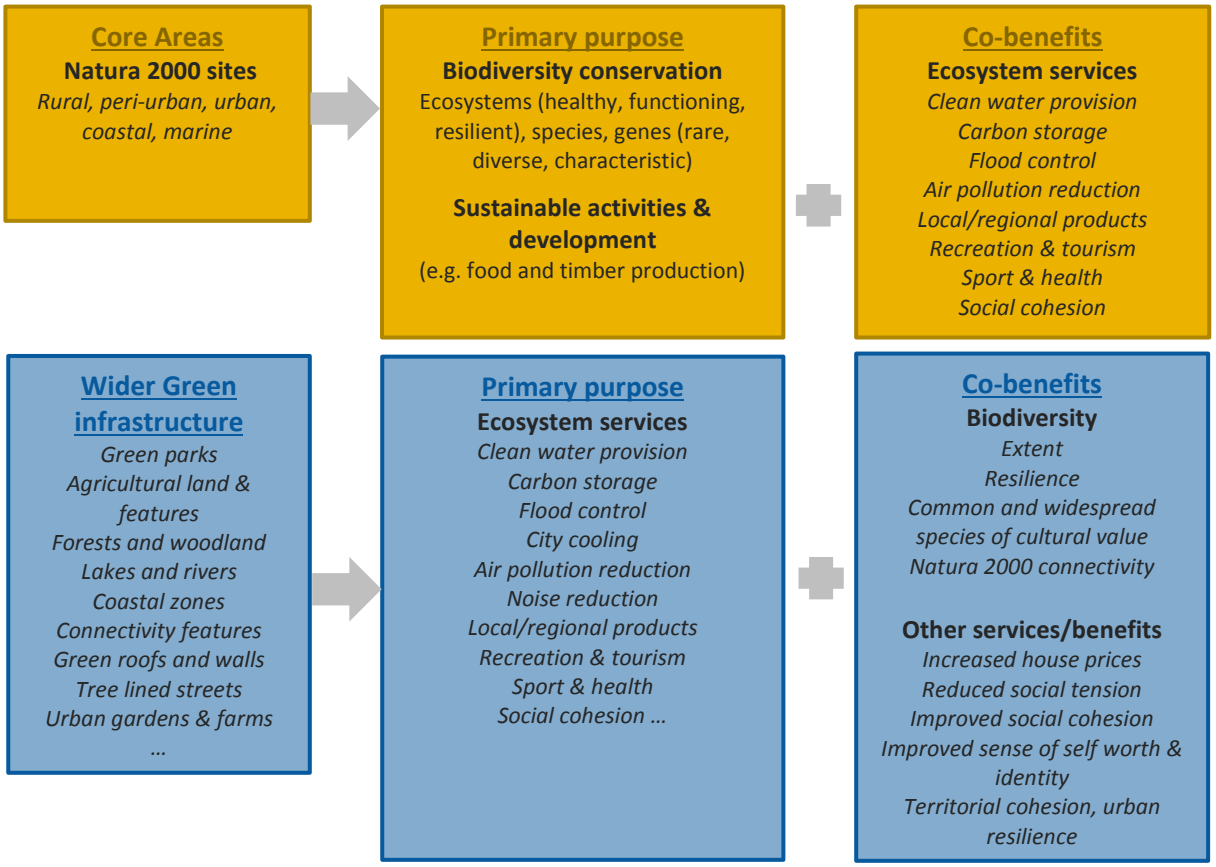


Figure 1 Aims of Natura 2000 network and wider green infrastructure and relation to health and social benefits

Source: own representation

The EU Biodiversity Strategy (Target II) commits for the better protection for ecosystems, and more use of green infrastructure (including a 15% restoration target for 2020). Green infrastructure is a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, green infrastructure is established both in rural and urban settings. While biodiversity conservation plays an integral part in green infrastructure, the focus is on the provision of multiple ecosystem services, including a range of benefits to health and social wellbeing.

Can protected areas and green infrastructure help?

There is a clear and undisputable link between green areas and health and social benefits. Green areas known to deliver such benefits range from small scale urban infrastructure (green roofs and walls, tree belts, green noise barriers etc.) to wider natural and semi-natural areas (urban green areas and parks, nature conservation areas in the vicinity of cities, wider forest areas etc.). Consequently, the development of EU green infrastructure network – comprising of a wide variety of different green elements - can play an important role in maintaining and enhancing the health and social benefits provided by nature. Furthermore, a strategically planned network of green areas at the EU level can help to bring added value, for example, by catalysing political and financial support, sharing knowledge and good practise, supporting transnational initiatives, and ensuring an equitable sharing of such benefits.

In terms of protected areas and the Natura 2000 network, there is a clear synergetic relationship between Natura 2000 sites and health and wellbeing benefits, particularly when it comes to the management of green areas to deliver health and social benefits. In general, the current evidence indicates that, while a protected area status is not an absolute precondition for an area to deliver health and social benefits, Natura 2000 site and other protected areas, especially the ones located within or close to urban areas, are a very useful mechanism for maintaining and promoting such benefits. This is in particular due to the physical infrastructure (network of trails, campsites etc.) and governance frameworks in place that helps to facilitate the delivery of benefits.

The existing evidence, including the examples provided in earlier chapters, highlights the importance of physical infrastructure in lowering the barrier to access and enjoy nature, encouraging healthier lifestyle and supporting the delivery of physical, mental and wider societal benefits. Establishing and maintaining such infrastructure is a common characteristic of Natura 2000 sites and other protected areas, enabling easy access to stakeholders. Furthermore, Natura 2000 sites and other protected areas are recognised locations with known ecological values and related information. This makes such areas commonly desirable destination for educational and other social purposes, linking to cognitive and social cohesion benefits. Similarly, building on their status and information base, Natura 2000 sites and protected areas may help focus community activity and volunteering by connecting with the idea of place and a sense of community identity. Protected areas also often have established mechanisms for stakeholder engagement and attracting funding, which is something of crucial importance. Existing case studies show that protected areas managers, including managers of individual Natura 2000 sites, play a proactive role in initiating project that promote health and social benefits of nature.
For example, the Walkability Project in Pembrokeshire, the UK (see

Table 2) aims to improve the health and well-being of local people by encouraging and supporting them to use walking routes in the Pembrokeshire Coast National Park. The project is co-hosted by the national park authorities and the local health board. The cooperation of these two organisations - and the prominent role of the national park managers - is considered as one of the key success factors for the initiative, as generally leisure activities led by the leisure services tend to focus primarily on indoor exercise. Similarly, a pioneering initiative of Nordic hiking trails in the Białowieża National Park, Poland (see table below) has been developed thanks to a collaborative effort by multiple stakeholders involved in the national park management, as well as finance from EU and national sources supporting the national park. The key aim of this initiative is to promote health through outdoor physical activity while increasing environmental awareness.

What are interesting case examples across Europe?

The workshop will present 20 case examples across Europe in which protected areas and wider green infrastructure yield benefits to human health and/or social cohesion, often in addition to benefits to biodiversity or wider ecological benefits. These case examples illustrate the diversity of approaches for example with respect to scale (e.g. local initiatives of citizens or municipalities, national approaches), the stakeholders involved or funding sources. In some cases, financing instruments of the European Union have been involved; in other cases, the initiatives are relying on local and voluntary actions of citizens and civil society. In many cases, Natura 2000 sites are an integral part of the initiative, both in rural settings, as well as in urban and peri-urban areas.

Table 2 Case examples across Europe

Country	Case	Description	Natura 2000/GI
Belgium	Hoge Kempen National Park	Hoge Kempen National Park is Belgium's only national park. It contributes to the social cohesion and regeneration of a former coal mining region that was at risk of economic decline.	Natura 2000
Bulgaria	Zmeeva Dupka Eco-Trail	The construction of an eco-trail in the Natura 2000 site Zmeeva Dupka cave has helped different social groups to discover nature and develop a healthier lifestyle while deterring illegal and exploitative nature use.	Natura 2000
Czech Republic	Chrudim, Zdrave mesto (Healthy City)	In 2001, the city of Chrudim joined the WHO Healthy Cities Project. Since then, the city has implemented a "Plan of Municipal Greenery Maintenance" and has invested in new areas of green infrastructure.	Green infra-structure
Denmark	Copenhagen, Increasing Well-being through Climate Change Adaptation	The City of Copenhagen is implementing ambitious climate change adaptation plans using green and blue approaches to increase the quality of life for its citizens. Copenhagen's waterways are now safe for public bathing and new green spaces provide new opportunities for recreation, tourism and biodiversity.	Green infra-structure
Germany	Stuttgart, StadtKlima and Nature Conservation for Clean Air	In Germany, the City of Stuttgart has implemented GIS mapping, zoning legislation, and investment in green infrastructure to facilitate air exchange and control air pollution in the city, in addition to controlling emissions at their source. Since 2004, the city has recorded significant reductions in PM_{10} and NO_2 measurements.	Natura 2000
Ireland	Slí na Sláinte – Path to Health	The Irish Heart Foundation has set up the Slí na Sláinte project in 1996 that aims to promote regular walking among the population as it has numerous health benefits, including cardiovascular, pulmonary and articular benefits. Local authorities and local communities are encouraged to work together and start a health path in their area.	Natura 2000
Spain	Barcelona Green Infrastructure and Biodiversity Plan 2020	The "Barcelona green infrastructure and biodiversity plan 2020", launched in early 2013, sets the environmental goals that the Municipality intends to achieve by 2020 in order to become a city where natural and urban spaces interact and enhance one another.	Natura 2000
France	Villejuif, Le Parc des Hautes Bruyères	South of Paris, the Council of Val de Marne converted a brownfield site into 23 hectares of public park with the purpose of reducing noise from a motorway, as well as providing a valuable community resource. The park houses a number of public allotments, spaces for recreation, education and biodiversity.	Green infra-structure
Croatia	Zagreb, Medvednica Nature Park	Nature Park Medvednica is a protected area on the border of the city of Zagreb and offers residents and an increasing number of tourists a chance to escape the urban environment and enjoy nature through activities such as winter sports, walking and hiking, as well as educational programs.	Natura 2000
Italy	Slow Food	The Slow Food Presidia project aims to sustain traditional agricultural products and processing methods at risk of extinction, and to protect unique regions and ecosystems. Presidia are important for biodiversity; they contribute to local/regional culture and identity.	Natura 2000
Latvia	Rāzna National Park, Green Routes without Obstacles	The aim of "Green Routes without Obstacles" is to increase the availability of nature-based tourism for disabled people at three protected areas in Latvia, Lithuania and Belarus. At the Rāzna National Park in Latvia, efforts have been made to provide equal opportunities and access to this protected area.	Natura 2000

Country	Case	Description	Natura 2000/GI
Luxemburg	Eicherfeld, Terra, Community Supported Agriculture	Started in 2014, TERRA (Transition and Education for a Resilient and Regenerative Agriculture) is Luxembourg's first Community Supported Agriculture initiative. This locally based, grass roots, and community orientated model for the production of food provides opportunities for employment, volunteering, and participatory learning.	Green infra-structure
Hungary	Lake Hévíz, Hungary's Unique Thermal and Medicinal Lake	Lake Hévíz is a peat bottom thermal lake located in West Hungary within the Lake Hévíz Nature Protection Area. Its healing effects, which are primarily linked to its sulphur content and sulphur bacteria living in the water, are used for the treatment of rheumatic and locomotor diseases.	Natura 2000
Austria	Vienna, Neighbourhood gardens	Caritas Austria has initiated 3 neighbourhood gardens where residents of their care homes work together with volunteers. The residents are elderly people that need care, disabled people and underage refugees separated from their parents. Gardening brings these people closer together; the garden provides a common ground that enables new social interactions and learning from each other.	Green infra-structure
Poland	Hajnówka, The Land of the Bison and Primeval Forest Nordic Walking Park	In 2011, a network of Nordic walking trails opened in Hajnówka county in Eastern Poland. The trails spread across the Białowieża Forest, a UNESCO World Heritage site fully covered by Natura 2000 protected areas. It is a pioneering initiative aiming at engaging the local rural community, promoting health through outdoor physical activity, and increasing environmental awareness.	Natura 2000
Portugal	Cascais, Quinta do Pisão - Sintra-Cascais Natural Park	Quinta do Pisão is part of the Sintra-Cascais Natural Park, which belongs to the Natura 2000 network. The Quinta do Pisão is the redevelopment of abandoned agricultural land into a working farm and large public park offering walking and cycling paths, as well as a range of events based around sustainable tourism.	Natura 2000
Slovenia	Secovlje Salina Nature Park and Lepa Vida Spa	The Natura 2000 area Salina Nature Park generates 90 local jobs in the tourism and health sectors while maintaining biodiversity values of the area. A public private concession programme has supported the improved conservation status of this habitat for migratory birds as well as providing public access for 50,000 visitors per year.	Natura 2000
Finland	Kuopio, Moved by Nature Programme	Moved by Nature's primary aim was to promote the collaboration between nature and health sectors to allow vulnerable groups to benefit from access to physical activity in green spaces. Case studies and pilots were carried out in a number of areas, working with different population groups.	Natura 2000
Sweden	Alnarp, Rehabilitation Garden	The Alnarp Rehabilitation Garden was established as a research and development project involving nature-based rehabilitation (NBR), with a special focus on the role of nature in improving the mental health of patients. Based on the preliminary evaluation results, NBR is being integrated as a form of treatment in local health care provisions.	Green infra-structure
United Kingdom	Pembrokeshire Walkability and Exercise Referral in National Park	The Walkability Project started in 2011 and is a partnership between Pembrokeshire Coast National Park, the Welsh Government and the Hywel Dda Local Health Board. The project has encouraged and supported local individuals with higher health risks to walk in and around the National Park.	Natura 2000

Questions for the Workshop

- What Natura 2000 measures (management, restoration) can help to determine, support and promote health and social benefits in particular?
- What type of Green infrastructure elements and related management measures (e.g. urban green spaces) can help to determine, support and promote health and social benefits in particular?

11 GOVERNANCE INSIGHTS

Who are the stakeholders already involved in initiatives related to health and social benefits from biodiversity and nature protection?

A wide range of initiatives and projects exist across the EU that bring together stakeholders from the health, social and environment sectors. The majority of these **cross-sectoral collaborations** involve or are led by NGOs (mainly those operating at the local level). Other groups, like academic and research institutions, the private sector and local voluntary associations play an important role as well. The involvement of local citizens or residents as a specific stakeholder group is often key, particularly where an initiative addresses urban planning or the restructuring of neighbourhoods or districts.

At the **governance** level, various formal structures and approaches have been developed and implemented within European countries to bring together stakeholders from the nature, health or social sectors. Particularly local governments and authorities play an important role in facilitating cross-sectoral work at the nexus between health, social benefits and nature, as most projects and initiatives focus on specific local sites, including urban green areas, Natura 2000 sites, other protected areas, and unprotected rural areas. Examples of the formal governance structures include cross-ministerial or municipal working groups, fora or platforms or thematic/topic committees.

The **level of engagement** of each of the stakeholders group differs per sector. Their level of knowledge and insights on the health and social benefits of nature and biodiversity also differ, which directly influences their involvement. Stakeholders from the environmental sector seem to be more actively engaged compared to, in particular, the health sector to date.

What are the success factors and tools that enable progress?

Success factors defined by stakeholders that facilitate cross-sectoral collaborations and initiatives are defining clear and common objectives, empowerment and building trust, agreeing on a common language, persistence and ensuring continuity, and ensuring long term funding opportunities. Furthermore, evidence-based arguments are powerful tools for bringing in new stakeholder groups, particularly politicians and authorities. In some contexts, scientific evidence e.g. in the form of peer reviewed epidemiological studies or clinical trials can help engaging stronger the health community.

Having the support of a governmental body often stimulates action, either through the implementation of a policy or strategy (e.g. health strategies that integrate nature, green infrastructure strategies that recognise air pollution or heat island mitigation benefits), the availability of funding schemes for health/social/nature initiatives or a political champion that plays an important role in awareness raising and putting nature-based solutions on the policy agenda.

What are challenges that we need to address?

While initiatives exist that address the health and social benefits of nature and biodiversity, awareness raising efforts are required to ensure the further involvement of more stakeholders – particularly from the health sector. Effective dissemination of information and evidence among people working at the grass-root level as well as policy makers, to ensure that those elements that seem to be facilitating success and the realisation of goals are shared. By capturing this knowledge, other countries, regions and municipalities can implement similar initiatives, and smaller projects can be rolled out on a wider scale. Furthermore, mapping of green infrastructure, its proximity to population centres, can help provide a

basis to explore actual and likely health and social benefits (see ongoing MAES initiative of the EU and Member States).

Moreover, greater support from each governance level would further facilitate work at the health-social-nature-nexus. Increased funding opportunities (e.g. EU funding via LIFE and regional funds) and formal structures/institutional arrangements can provide the necessary frameworks and support that allow stakeholders to collaborate effectively.

Questions for the Workshop

- Which stakeholders are building on the health and social benefits of interacting with nature?
- What governance structures and policy frameworks are helping to determine and drive progress on nature-health-social benefits?
- What are the key barriers that limit stakeholders in initiating or implementing initiatives or projects building on the health and social benefits of nature and biodiversity?
- What is needed to ensure (better) involvement from stakeholders from the health sector?
- How can the EU (through its policies and funding instruments) support cross-sectoral collaborations among health/social/nature stakeholders?

12 DEVELOPING A ROAD MAP

Overarching Questions

- How can we build on the benefits from the nature-health-social benefits nexus?
- What more can be done and by whom in order to improve knowledge, communication, stakeholder cooperation and governance, implementation and investment?

The breakout sessions and road map will explore who is doing what to realise nature-health-social benefits synergies and what more can and should be done by whom. This will focus on the needs for developing the knowledge base, communication, and tools that can help; stakeholder initiative, cooperation and governance; policies and enabling measures; implementation and investment.

Issues: multi-level governance problem – requiring action across all levels

Actions to realise health-social-nature synergies are taking place across Europe, sometime driven top down by EU, national or regional policies, sometimes driven by local practice by cities to small scale organisation and citizens initiatives (i.e. bottom-up). They have sometimes the health-social-nature synergies explicitly in mind, and other times the wider benefits are “auxiliary” to the principle focus of the initiative. A range of actors are engaged – from protected area authorities and green NGOs, to city or regional authorities, a spectrum of health sector stakeholders (whether ministries, national bodies (such as the NHS in the UK), doctors associations, NGOs and academia), a range of social stakeholders and of course policy makers and funders at all levels. Action at all levels, by all stakeholders is needed and where possible building on multi-disciplinary collaborations. **So, what could be threads of a road map for realising the health and social benefits of nature and what might be priorities?**

- **The knowledge base** needs to be developed further – areas include physical health benefits and mental health benefits, to cognitive development benefits of children, to social cohesion benefits of working with nature. **– What do you see as priorities for knowledge development, why and who could fund the research? What kind of research outputs can support practical applications in this area?**

- The knowledge base needs to be integrated into a **wider science-policy interface** (SPI) **– how and who can help with the SPI?**
- **More tools** can help in the identification of suitable areas for investment and management and support communication – e.g. ecosystem mapping tools, monetary evaluation **– what are promising tools that can enable progress and who should support these and use these?**
- **Improved communication** helps, but often helps most if done by the right people, perceived as independent **– who can ideally communicate what to whom?**
- **Strategies and plans** can help facilitate actions (e.g. health strategies, green infrastructure plans, climate change adaptation plans) **– which plans, by who, making use of which type of language (i.e. on integration) can help?**
- **Synergies can be driven by policy coherence** – e.g. local regeneration, social inclusion and nature; climate adaptation can support health and sense of place. **Which policy synergies can be made more of? Where are there particular gaps that could be realised? Are there examples of conflict that needs resolution?**
- **Windows of opportunities are key moments to make steps forward –** e.g. on financing rules such as Cohesion Policy regulations, regulation reviews, public consultation on strategies and plans, mid-term evaluations, local and national budget declarations. In addition, there are regular windows of opportunities through private investment or procurement decisions, e.g. health and social services, cities. **What windows of opportunity do you see as being promising at the national to EU levels?**
- **Financing as ever is key for progress and sustainability of initiatives –** e.g. cohesion funds, LIFE funding at EU level, and national, regional, and local public and private funding **– which funds do you see as offering particular opportunities to support the health-social-nature synergies and what can be done to achieve greater added value?**
- **Champions drive forward change –** e.g. majors with climate change strategies, regions with regeneration ambitions, local citizen groups, doctors and hospitals, as well as Members of Parliament. **What champions can usefully be engaged to help drive forward synergies?**

Next steps

The workshop will debate these questions and help identify the threads of a health-social-nature roadmap. This and the wider insights from the sessions of both days will feed into the final project report, which will be disseminated to all participants. The issue of nature's contribution to health and social objectives and indeed wider socio-economic national priorities will be an ongoing priority area of research.

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