

Eco-Health Relationship Browser Notecards

Double-sided, Elementary



These materials are part of EPA Report #EPA/600/R-18/186.

Instructions:

1. Print out these Notecards DOUBLE-sided (preferably in color so that the categories are visibly distinct for students (ecosystems in **green**, ecosystem services in **blue**, and health outcomes in **red**)).

Optional: If you have time, cut out and laminate the cards. If you don't have time, students can just hold the paper cards in their hands. You could also slide the pieces of paper into sheet protectors for a quick lamination substitute.

2. Punch holes in the black circles on the Notecards (or, if in sheet protectors, use the existing holes in the sheet protectors).
3. Using yarn or string, tie a loop (long enough to drape the card around the neck) around the Notecards.
4. Follow the instructions in the Lesson Plan: *Connecting ecosystems and human health*.
5. Store for use in future years—just a one-time set-up!

(Elementary notecards, updated 9/8/2017)



Have time?
Laminate and
hole-punch the
notecards.



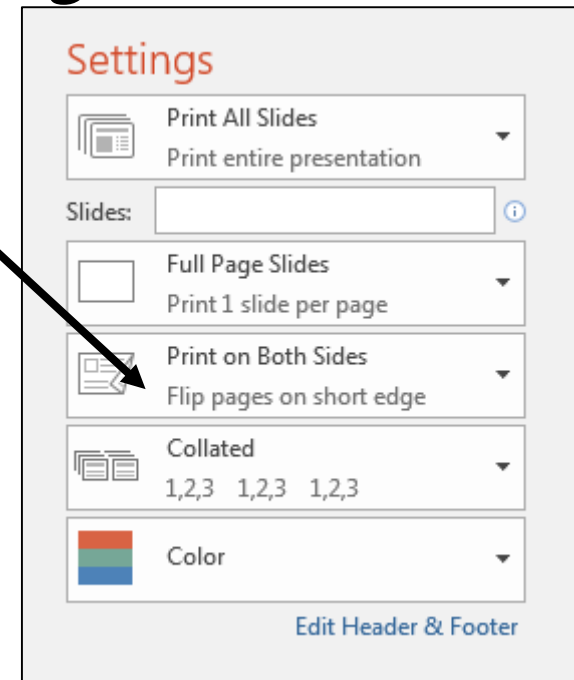
Don't have
time? Use
Sheet
Protectors!

Eco-Health Relationship Browser Notecards: Double-sided (*has connections on back of card*)

(last updated 9/8/2017)

This side intentionally left blank for double-sided printing purposes.

If printing double-sided, choose to “***flip on short edge***” when in the Printing Window.





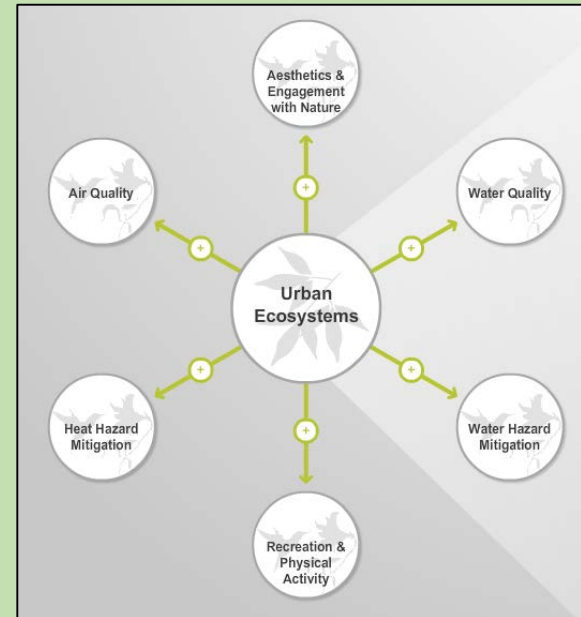
Urban Ecosystems



All information available from www.epa.gov/EnviroAtlas

Urban Ecosystems

- An **urban ecosystem**, sometimes referred to as a city, is a changing system that contains both man-made and natural environments.
- Urban ecosystems provide their own important services that add to human well-being in those urban areas.



All information available from www.epa.gov/EnviroAtlas

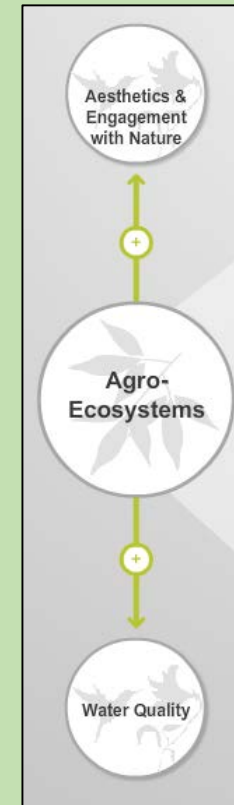
Agro-Ecosystems



All information available from www.epa.gov/EnviroAtlas

Agro-Ecosystems

- An **agro-Ecosystem** is an ecosystem that has been changed by humans to make food, fiber for paper or fabrics, or farming-based products.
- An agro-ecosystem may contain crops, wetlands, and wildlife habitats.
- Agro-ecosystems are often popular for recreation and with bird watchers and hunters.



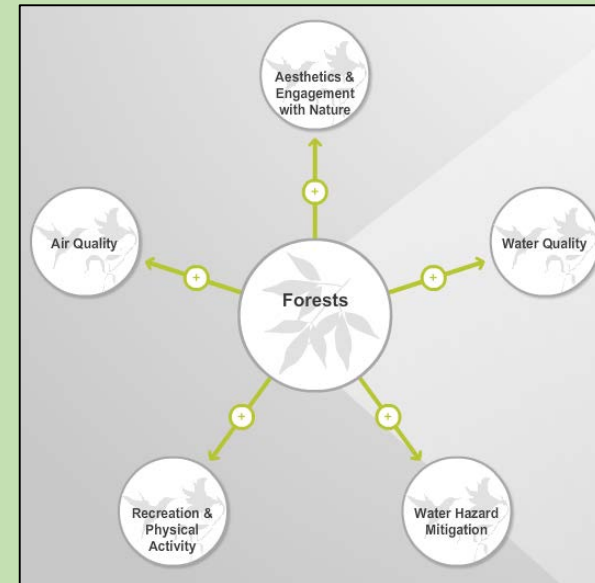
Forests



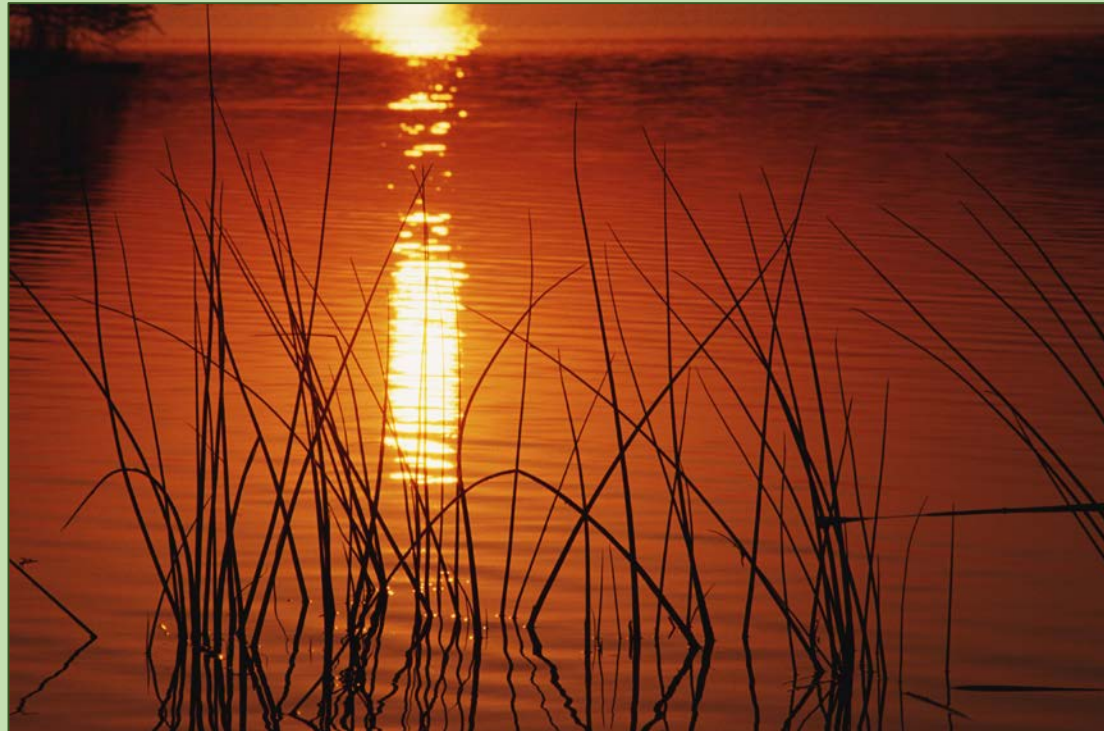
All information available from www.epa.gov/EnviroAtlas

Forests

- **Forests** are made up of different types of trees and plants based on climate, location, and water.
- Forests are often used for the goods that they provide, such as trees (timber) and paper.
- Forests also clean pollution from water and air.
- Forests are also used for recreation such as camping or hiking.



Wetlands



All information available from www.epa.gov/EnviroAtlas

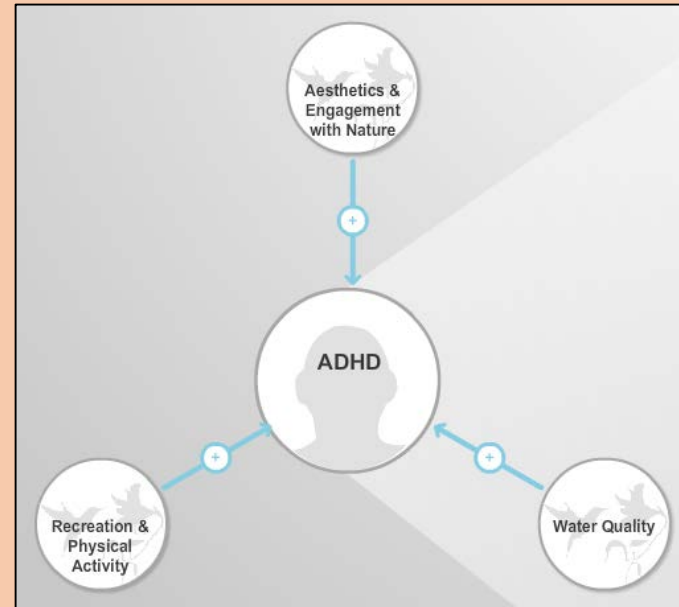
Wetlands

- **Wetlands** are vegetated areas covered by shallow water for all or parts of the year.
- Common wetlands include coastal salt marshes, bogs, and swamps.
- Wetlands are used for recreation such as canoeing/kayaking, fishing, bird watching and hunting.



ADHD

- Attention-deficit hyperactive disorder (ADHD) is the most common disorder in children.
- ADHD symptoms are a high level of inattention, hyperactivity, or both in children and teenagers.
- ADHD affects more than 2 million children.



All information available from www.epa.gov/EnviroAtlas

ADHD: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

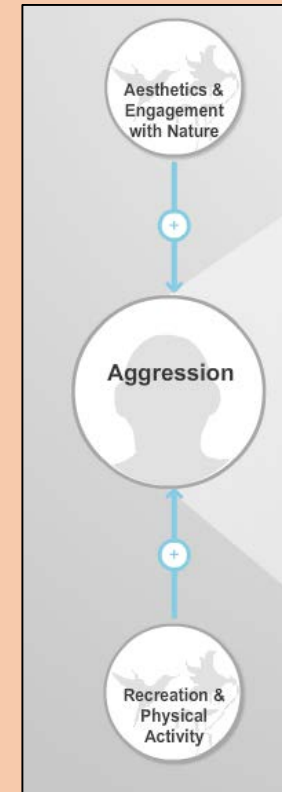
ADHD / AESTHETICS & ENGAGEMENT WITH NATURE: Several studies suggest spending time in nature has a positive effect on children with ADHD, meaning that ADHD symptoms are reduced (Markevych et al., 2014; n=1,932, Munich, Germany).

ADHD / RECREATION & PHYSICAL ACTIVITY: Children with ADHD experience less symptoms following exercise in green environments (Faber et al., 2001; n=96, USA).

ADHD / WATER QUALITY: One study found that children exposed to a chemical called Manganese in water showed more hyperactive behaviors (Bouchard et al., 2007; n=46, Quebec).

Aggression

- Aggression is shown in many ways, emotional ways like anger or irritation, or physical acts like hitting.
- All ages and types of people can feel aggression but it is more common for men between the ages of 20-30.



Aggression : Eco-Health Connections

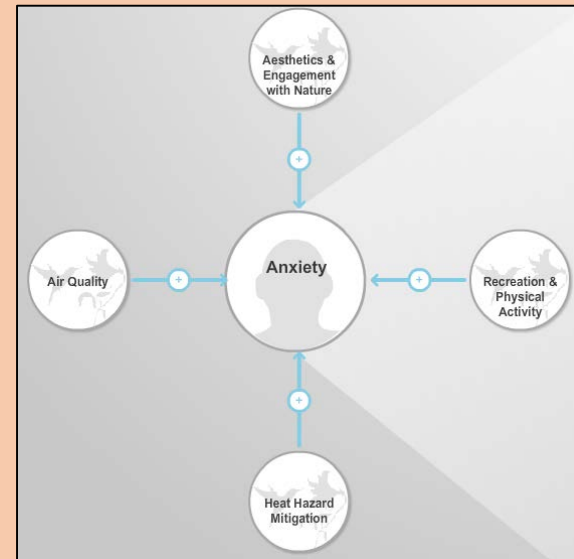
Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

AGGRESSION / AESTHETICS & ENGAGEMENT WITH NATURE: People who had more nearby nature reported fewer acts of aggression and violence against others. Nearby nature was related to lower levels of aggression against partners and aggression against children (Kuo et al., 2001; n=145, Chicago). Also, taking a walk outdoors can reduce feelings of anger by nearly 8% (Peacock et al., 2007; n=20, UK). Running outdoors can reduce feelings of hostility by 80% (Harte et al., 1995; n=10 males, Australia).

AGGRESSION / RECREATION & PHYSICAL ACTIVITY: Study participants reported less feelings of anger after participating in physical activity (Pretty et al., 2005, n=263, UK).

Anxiety

- Anxiety is worrying too much about everyday things. It can affect normal daily behavior. There are different types of anxiety.
- Problems related to anxiety are the most common mental illness in the United States, affecting 18% of adults.



All information available from www.epa.gov/EnviroAtlas

Anxiety : Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

ANXIETY / AESTHETICS & ENGAGEMENT WITH NATURE: Spending time in green space and exercising outdoors can lower anxiety; this effect is increased by the presence of water. (Shin et al., 2013; n=139 young women, Korea).

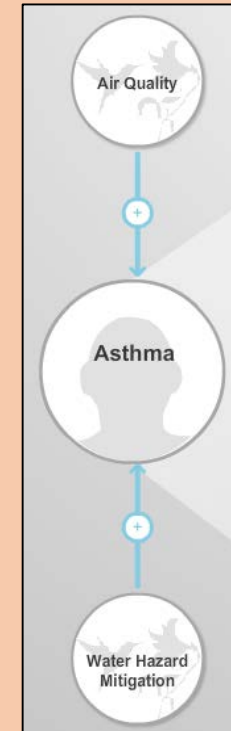
ANXIETY / RECREATION & PHYSICAL ACTIVITY: Exercising reduces feelings of anxiety. How hard and long you exercise, as well as location while exercising (indoor or outdoor; natural or other view), affects how much anxiety is lowered. (Pretty et al., 2005; n=100, UK).

ANXIETY / HEAT HAZARD MITIGATION: The number of anxiety and stress-related disorders often increases during extreme heat events. (Hansen et al., 2008; n=1.16 mill., Adelaide, Australia).

ANXIETY / AIR QUALITY: A study in California showed that higher levels of ozone in the air caused an increase in anxiety levels. (Evans et al., 1988; n=1,002 adults, Los Angeles, California).

Asthma

- Asthma is a disease of the airways that makes breathing difficult. Inflammation of the air passages narrows the airways that carry oxygen to the lungs.
- Both children and adults have asthma.
- Asthma affects 24.6 million Americans.



Asthma : Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

ASTHMA / AIR QUALITY: When air pollution increases, the odds of having an asthma attack are higher.

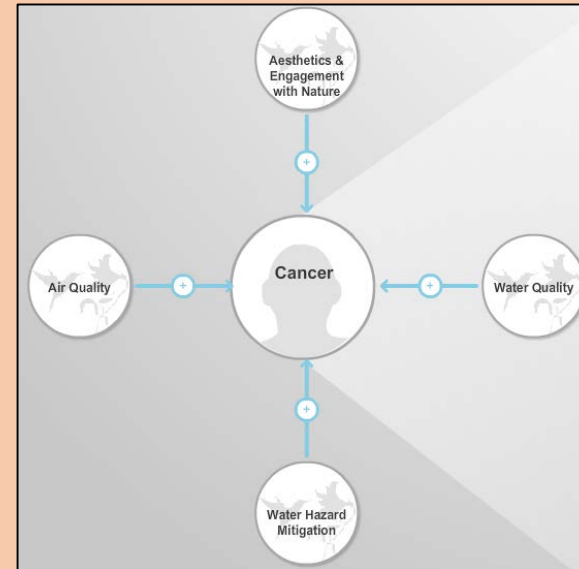
A study in Taiwan showed that high levels of total particles in the air can increase the odds of having asthma by 32% (Wang et al 1999; n=165,173 adolescents, Taiwan).

ASTHMA / WATER HAZARD MITIGATION: Dampness and mold in the home show an association with higher reported asthma symptoms in people. Events like flooding that increase dampness and mold in the home may increase asthma symptoms.

In Canada, scientists determined that the odds of asthma for children increased 29% when dampness and/or mold were in the home (Dales et al., 1991; n=13,495, Canada).

Cancer

- Cancer is the growth of abnormal cells in the body.
- Anyone can develop cancer, but it is more common as people grow older.
- Cancer is the second most common cause of death in the United States with 1,600 deaths per day.



Cancer: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

CANCER / AESTHETICS & ENGAGEMENT WITH NATURE: Spending 10+ hours a week outside has been linked to an increased risk of skin cancer. (Astell-Burt et al., 2013; n=267,072, Australia).

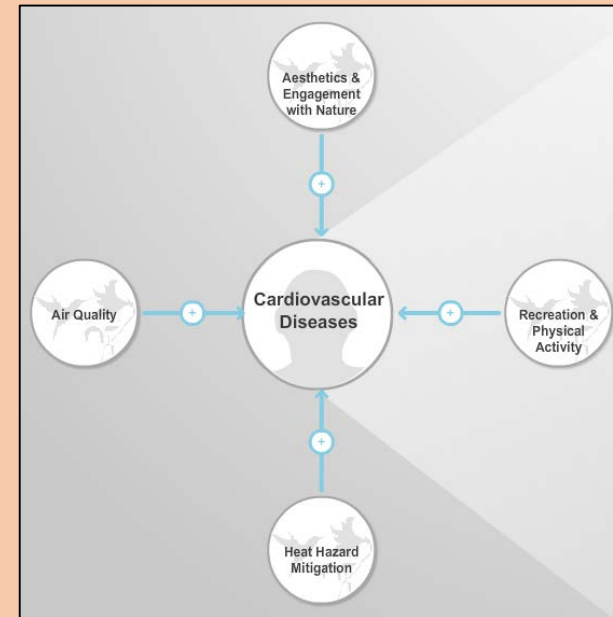
CANCER / WATER QUALITY: Death from stomach cancer was 82% more likely in areas with contaminated water from Chromium than in areas without contaminated water. (Beaumont et al., 2008; Liaoning Province, China).

CANCER / WATER HAZARD MITIGATION: While looking at the connection between floods from Hurricane Agnes (1972) and numbers of certain cancers, researchers found that the most flooded areas had a greater number of cases of Leukemia and Lymphoma. The rate in the flooded area was 32/100,000 while the rate in the rest of upstate New York was 24.4/100,000 (Janerich et al., 1981; n=10 million, Western and Upstate New York).

CANCER / AIR QUALITY: Each increase of 10 micro-g/m³ of fine particulate air pollution was associated with an 8% increase in deaths from lung cancer (Pope III et al., 2002; n=500,000, USA).

Cardiovascular Disease

- Cardiovascular diseases are diseases that affect the heart and blood vessels.
- There are many factors that cause these diseases like diet, exercise, smoking, etc.
- Cardiovascular diseases are the leading cause of death worldwide.



Cardiovascular Disease: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

CARDIOVASCULAR DISEASES / AESTHETICS & ENGAGEMENT WITH NATURE: Study subjects walking in a forest had lower heart rates than those walking in an urban area (Lee J, et al., 2014; n=48, Japan).

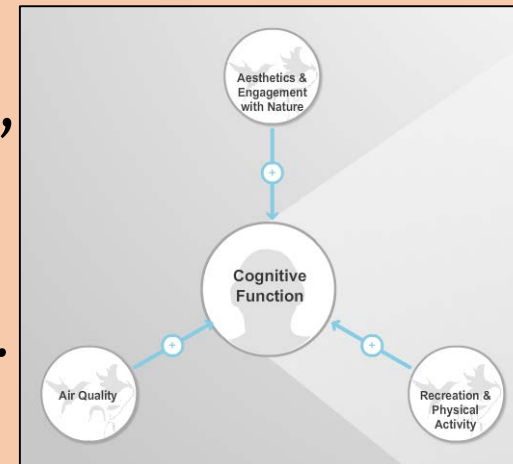
CARDIOVASCULAR DISEASES / RECREATION & PHYSICAL ACTIVITY: The chance of hospitalization and heart disease or stroke were lower among adults with a lot of greenness around their home compared to those in neighborhoods with less greenness (Pereira et al., 2012; n=1,415, Perth, Australia).

CARDIOVASCULAR DISEASES / HEAT HAZARD MITIGATION: Extreme temperature changes can increase the risk of being hospitalized and the risk of death from cardiovascular disease (Chen et al., 2014; n=126,925, 6 Cities in China).

CARDIOVASCULAR DISEASES / AIR QUALITY: Studies show that cardiovascular-related events, such as heart attack and stroke, are connected with increases in particulate matter in the air. (Prescott et al., 1998; n=450,000, Edinburgh), (Miller et al., 2007; n=65, 893, USA), (Wordley et al., 1997; n=428,000, Birmingham, UK).

Cognitive Function

- Cognitive function is a person's ability to think and process thoughts, including things like memory, learning new things, speech, and reading.
- Cognitive function can be harmed as people grow older or have head injuries.
- Alzheimer's is a disease that makes cognitive function worse. It is the 5th leading cause of death among Americans over 65.



Cognitive Function: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

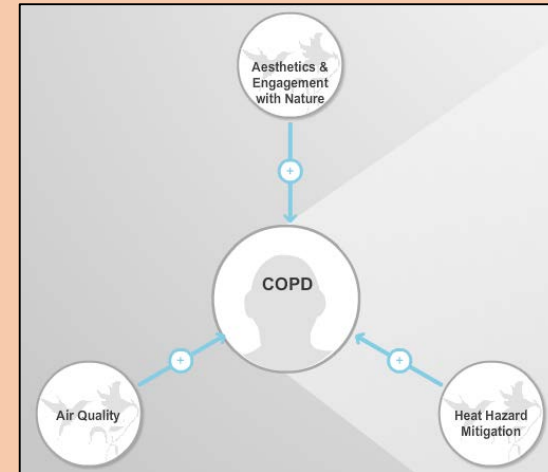
COGNITIVE FUNCTION / AESTHETICS & ENGAGEMENT WITH NATURE: A view of nature from a high school cafeteria window was found to help students do better in school. Views with lots of trees and larger classroom windows also helped students do better in school (Matsuoka, 2010; n=101 schools, Michigan).

COGNITIVE FUNCTION / RECREATION & PHYSICAL ACTIVITY: School-aged children who were in a 12-week physical activity program were more on-task in school (Mahar et al., 2006; n=243 children, North Carolina).

COGNITIVE FUNCTION / AIR QUALITY: Higher air pollution levels have been linked to lower cognitive functioning in both children and older adults (Calderon-Garciduenas et al., 2008; n=18, Mexico) (Power et al., 2010; n=680, USA).

COPD

- Chronic Obstructive Pulmonary Disease (COPD) is a disease of the lungs that makes it difficult to breathe. This includes chronic bronchitis, which is constant irritation of the airways, and emphysema, which includes damages to the lung's air sacs.
- 4 million people around the world have COPD. Mostly COPD affects people between 65-84 years old.



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COPD: Eco-Health Connections

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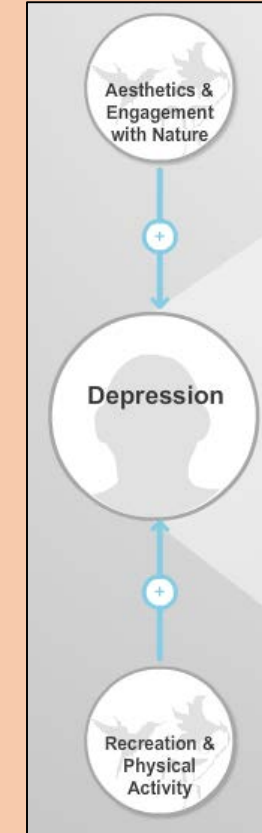
COPD / AESTHETICS & ENGAGEMENT WITH NATURE: Walking in green settings instead of city settings has been shown to increase lung health in senior women (Lee & Lee 2013; n=62, Korea).

COPD / AIR QUALITY: Emergency room admissions for chronic bronchitis and emphysema increased by 31-39% after more sulfur dioxide (SO₂) than normal was put into the air (Ponka & Virtanen 1994; n=2,807, Helsinki, Finland).

COPD / HEAT HAZARD MITIGATION: During a July 2006 heat wave in Portugal, a 1° C increase in average temperature was associated with a 5.4% increase in hospitalizations due to COPD for the entire population, with a 7.5% increase for women. The greatest number of people were in the hospital on the fourth day in a row of extreme heat (Monteiro et al., 2013).

Depression

- Traits of depression include low mood, loss of interest or enjoying things, and less energy.
- Women get depression twice as much as men.
- In people between 18-44 years old, depression is the leading cause of disability and premature death.



Depression: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

DEPRESSION / AESTHETICS & ENGAGEMENT WITH NATURE:

- [1] After running outdoors, study subjects reported feeling much less depressed--an 85% reduction (Harte et al., 1995; n=10, Australia).
- [2] Taking a walk outdoors reduced depression by 6%, while walking indoors did not (Peacock et al., 2007; n=20, UK (G)).
- [3] The presence of parks or recreation facilities in the neighborhood was associated with a lower risk of depression (Garipey, et al., 2014; n=9,025, Canada).

DEPRESSION / RECREATION & PHYSICAL ACTIVITY:

- [1] Across 10 green exercise case studies, participants reported lower feelings of depression by over 2% after physical activity (Pretty et al., 2005; n=263, UK).
- [2] The presence of parks or recreation facilities in the neighborhood was associated with a lower risk of depression (Garipey, et al., 2014; n=9,025, Canada).
- [3] Individuals walking in a forest had improved self-reported mood when compared to individuals walking in urban areas (Lee et al., 2014; n=48, Japan).

Fatigue

- Fatigue is feeling tired and lacking energy. It can be a normal response to physical activity or emotional stress but can also be a more serious condition.
- Any person can experience fatigue.



Fatigue: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

FATIGUE / AESTHETICS & ENGAGEMENT WITH NATURE: Walking or running outdoors can lower fatigue.

[1] People who were physically active while in natural settings had higher energy levels when compared with people who were not active and those who were active indoors (Kinnafick and Thogersen-Ntoumani, 2014; n=40, United Kingdom).

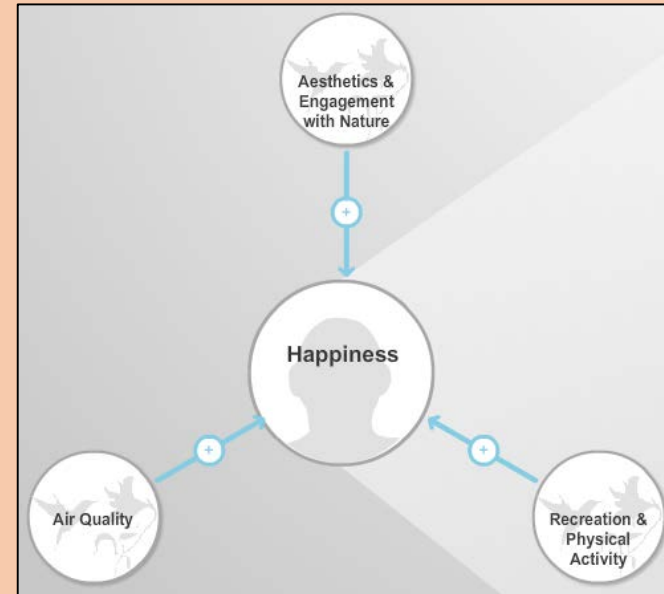
[2] People reported increased energy after walking outdoors, but exercising and viewing nature through virtual reality had little effect (Plante et al., 2006; n=112, US).

FATIGUE / RECREATION & PHYSICAL ACTIVITY:

People who were physically active while in natural settings had higher energy levels when compared with people who were not active and those who were active indoors (Kinnafick and Thogersen-Ntoumani, 2014; n=40, United Kingdom).

Happiness

- Happiness is an emotion that people feel when good things happen.
- People who live in countries with higher incomes and less suffering have higher levels of happiness.
- Factors include quality of life, friends, family, and job.



Happiness: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

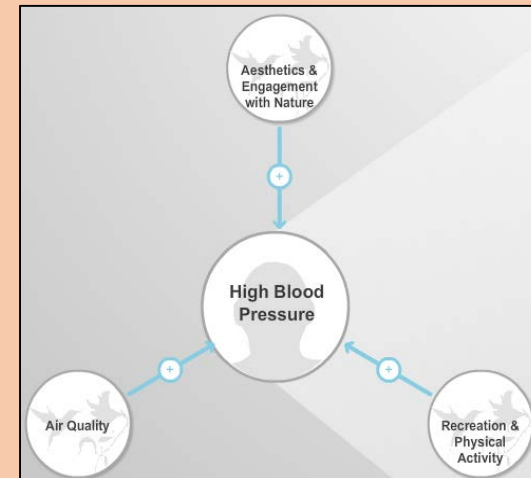
HAPPINESS / AESTHETICS & ENGAGEMENT WITH NATURE: In a study using a phone app to define happiness levels, people were happier outdoors in nature than in urban places. Beach areas were the happiest places--about 6 points higher than an urban environment--a difference like going out versus doing housework (MacKerron & Mourato 2013; n=21,947, UK).

HAPPINESS / RECREATION & PHYSICAL ACTIVITY: Short periods of green exercise improve self-esteem and mood. This improvement is greater around water and is true no matter how long or how hard the exercise is (Barton & Pretty 2010; n=1,252, UK).

HAPPINESS / AIR QUALITY: In five countries, when nitrogen and lead air pollution levels were decreased, happiness levels increased (Welsch 2006).

High Blood Pressure

- High blood pressure is when a person's blood pressure is high most of the time.
- High blood pressure can lead to problems including heart disease, heart failure, and stroke.
- Risk of high blood pressure increases with age. It is also affected by things like weight, smoking and stress.



High Blood Pressure: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

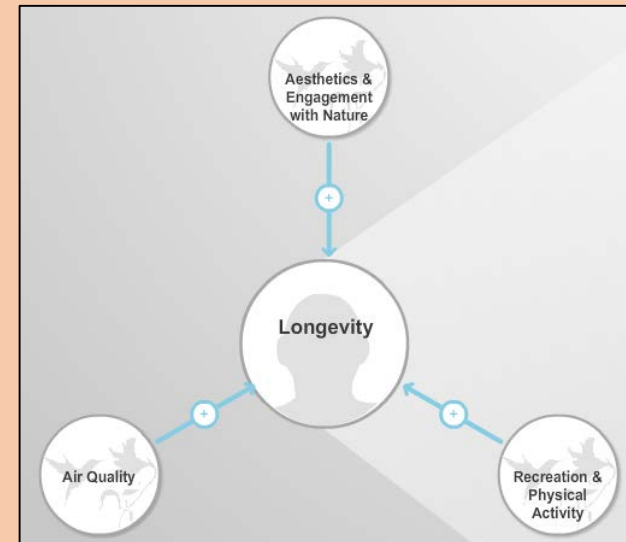
HIGH BLOOD PRESSURE / AESTHETICS & ENGAGEMENT WITH NATURE: Exercising in green environments or viewing natural scenes can lower blood pressure. (Pretty et al., 2005; n=100 [20/group], UK) (Hartig et al., 2003; n=112, California).

HIGH BLOOD PRESSURE / RECREATION & PHYSICAL ACTIVITY: Exercise, including light or moderate activity, can lower blood pressure by 3% to 7%. Exercising in green environments might lower it even more. (Pretty et al., 2005; n=100, UK).

HIGH BLOOD PRESSURE / AIR QUALITY: Exposure to particulate matter and NO₂ from cars is strongly associated with higher blood pressure (Brook et al., 2009; n=31-50, Toronto, Canada & Ann Arbor, Michigan).

Longevity

- Longevity, or life expectancy, is the number of years a person may live.
- Life expectancy varies depending on where you live, medical treatments available, nutrition and lifestyle.
- Longevity has increased by four years since 1990 around the world.



Longevity: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

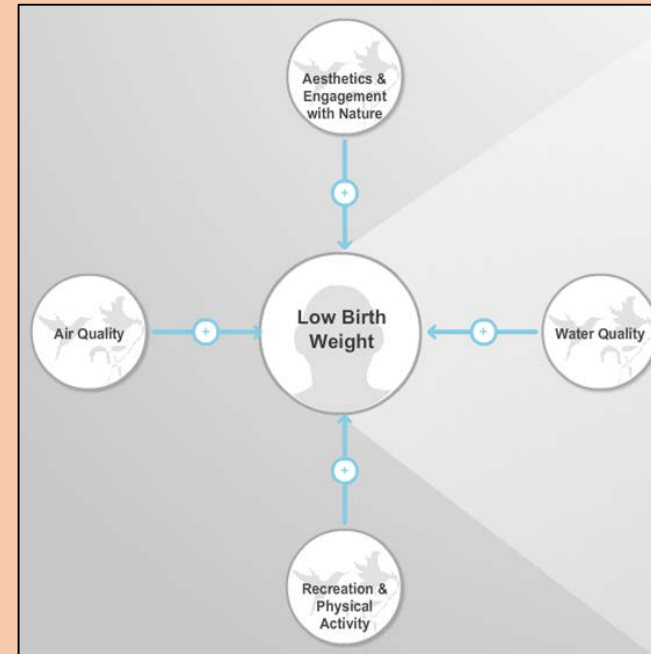
LONGEVITY / AESTHETICS & ENGAGEMENT WITH NATURE: People with low income had lower levels of health inequality if they lived in green areas (Mitchell and Popham 2008; n=4.8 million +, England).

LONGEVITY / RECREATION & PHYSICAL ACTIVITY: People lived longer when there were parks and outdoor green areas for recreation (Takano et al., 2002; n=3,144, Tokyo).

LONGEVITY / AIR QUALITY: A study looked at air pollution levels and life expectancy. The study found that people live longer with less air pollution. (Mechler et al., 2002; n=700 million, Europe).

Low Birth Weight

- A baby born with low birth weight is less than 5 lbs 8 oz.
- Around 30 million babies are born with low birth weight around the world.



All information available from www.epa.gov/EnviroAtlas

Low Birth Weight: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

LOW BIRTH WEIGHT / AESTHETICS & ENGAGEMENT WITH NATURE: Mothers who lived in an area with trees were less likely to have babies with low birth weight. This may be caused by lower stress levels because of green space, improved relationships, and increased physical activity, all of which have been proven to affect infant birth weight (Donovan et al., 2011; n=5,696, Oregon).

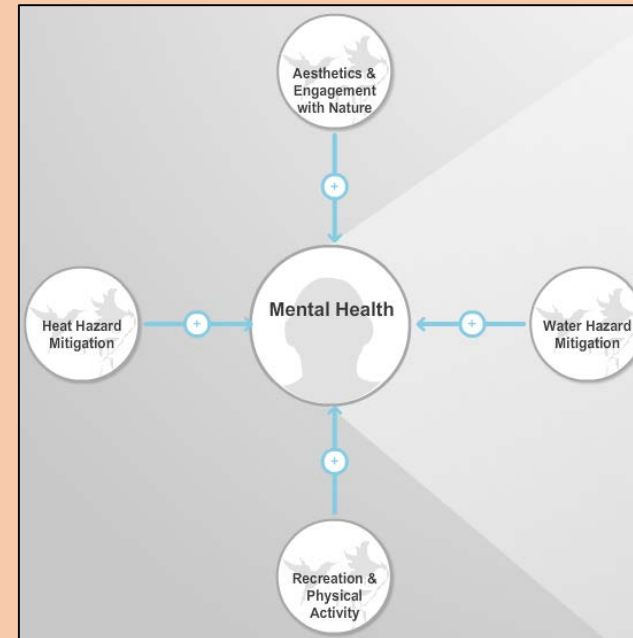
LOW BIRTH WEIGHT / RECREATION & PHYSICAL ACTIVITY: Refer to information above.

LOW BIRTH WEIGHT / WATER QUALITY: Atrazine is an herbicide that has a high level in drinking water from May to September. There was an increased chance of low birth weight where the last three months of pregnancy occurred whole or in part within the May-September period. (Villaneuva et al., 2005; n=3,510 births, France).

LOW BIRTH WEIGHT / AIR QUALITY: Increasing total greenness and less air pollution in mothers' homes has been linked to small increases in birth weight and slightly lower odds of pre-term birth. (Laurent et al., 2013, n=80,000; Los Angeles and Orange Counties, CA).

Mental Health

- Mental health is the overall well-being of a person's state of mind. Dealing with stress and working in your community show good mental health.
- Mental and behavioral disorders can affect 25% of people at some time during their life.



Mental Health: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

MENTAL HEALTH / AESTHETICS & ENGAGEMENT WITH NATURE: People who live near green spaces and/or spend time in green environments report better mental health overall (There are 12 articles that show this connection on the EnviroAtlas Eco-Health Browser).

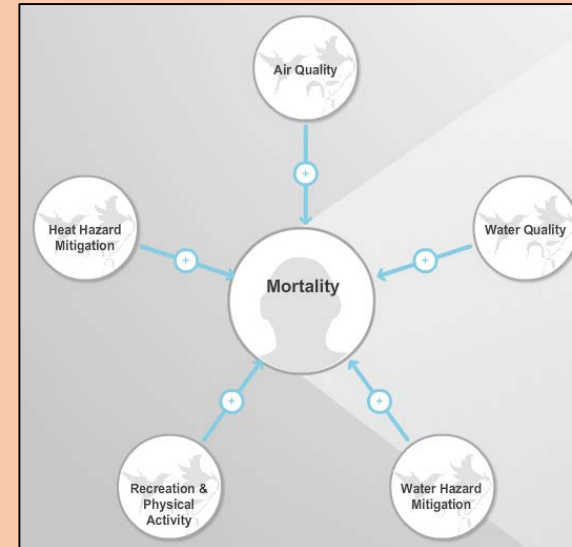
MENTAL HEALTH / WATER HAZARD MITIGATION: A study found that 48% of adults in flooded households had mental problems in the nine months following the flood, compared to only 12% of adults in non-flooded households (Reacher et al., 2004; n=467, Lewes, England).

MENTAL HEALTH / RECREATION & PHYSICAL ACTIVITY: Following an outdoor nature-based recreation experience, veterans had better attention and sense of peace (Duvall and Kaplan 2014; n=98, Michigan, US).

MENTAL HEALTH / HEAT HAZARD MITIGATION: Compared to non-heat wave periods, there was a 17.4% increase in hospital admissions for dementia during heat waves (Hansen et al., 2008; n=1.16 million, Adelaide, Australia).

Mortality

- Mortality means death. The number of deaths is a good indicator of the health level in a country.
- The number of deaths is affected by levels of heart disease, cancer, other diseases, and crime.



Mortality: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

MORTALITY / AIR QUALITY: A study of six cities found that an average of 3% fewer people died when there was less particulate matter (small particles in the air). This decreased death rate is like saving 75,000 people per year in the U.S. (Laden et al., 2006; n=8,096, 6 U.S. cities).

MORTALITY / WATER QUALITY: In Greece where a water supply was contaminated with Chromium, deaths were 98 times what were expected (Linos et al., 2011; n=131,000, Viotia, Greece).

MORTALITY / WATER HAZARD MITIGATION: In the 12 months following the Bristol Floods of 1968, there were 87 deaths among the 209 households affected, compared to 58 deaths in those same households in the 12 months prior to flooding—that's a rise of 50%. No significant difference was found in the non-flooded homes (Bennet 1970; n=770, Bristol, England).

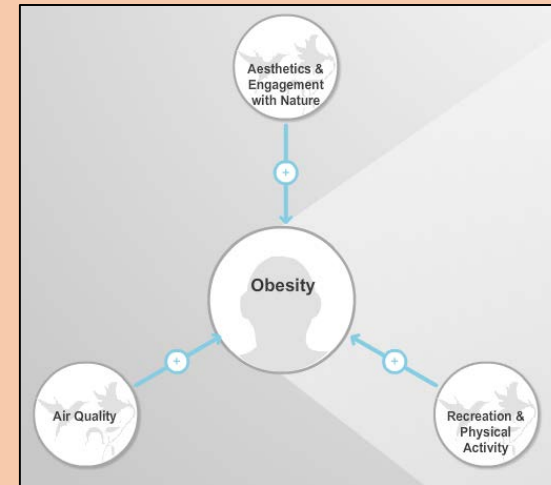
MORTALITY / RECREATION & PHYSICAL ACTIVITY: In a study of men aged 25-74, those whose energy output in walking, climbing stairs, and playing sports totaled 2000 or more kilocalories per week had a 28 percent lower death rate (from all causes) than less active men (Paffenbarger et al., 1986; n=12,936 men aged 25-74; USA).

MORTALITY / HEAT HAZARD MITIGATION: During a 1995 summer heat wave event in Chicago, there were 514 heat-related deaths and 696 extra deaths during the month of

July (Whitman et al., 1997).

Obesity

- Obesity is a disease characterized by being very overweight with a person having a body mass index (BMI) over 30.
- BMI is figured out by comparing a person's height and weight.
- Around the world, obesity has more than doubled since 1980.



Obesity: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

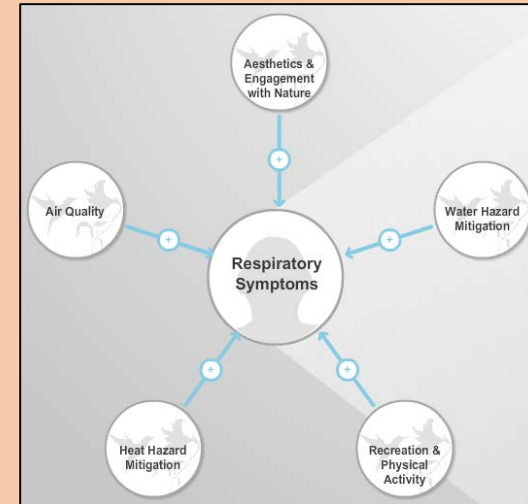
OBESITY / AESTHETICS & ENGAGEMENT WITH NATURE: If you live in a home with at least 100 meters of greenspace around it, you are less likely to be overweight or obese (Dadvand et al., 2014; n=3,178, Sabadell, Spain)

OBESITY / RECREATION & PHYSICAL ACTIVITY: Studies found that people who exercised had lower BMI scores. As the amount of physical activity increased, BMI scores decreased. (Tudor-Locke et al., 2010; n=5,000 adults, USA).

OBESITY / AIR QUALITY: Children may be at greater risk for childhood obesity if their mothers are exposed to polycyclic aromatic hydrocarbons (PAHs) during pregnancy. In this study, the more a mother was exposed to PAHs, the larger her child was during childhood (Rundle et al., 2011; n=702, New York).

Respiratory Symptoms

- Respiratory symptoms include coughing, difficulty breathing, or rapid breathing.
- Respiratory symptoms can affect any person but women are more likely to develop a long-term cough.
- Some factors are COPD, allergies, smoking and others.



Respiratory Symptoms: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

RESPIRATORY SYMPTOMS / AESTHETICS & ENGAGEMENT WITH NATURE: Children who played in city parks less than 5 hours a week were 52% more likely to be wheezing, coughing, sneezing, etc. (Grazuleviciene et al., 2014; n=1,489, Lithuania).

RESPIRATORY SYMPTOMS / WATER HAZARD MITIGATION: During the devastating 1988 flooding in Bangladesh, 17.4% of doctors' visits were because of lung and airway infections (Siddique et al., 1991; n=46,740, Bangladesh).

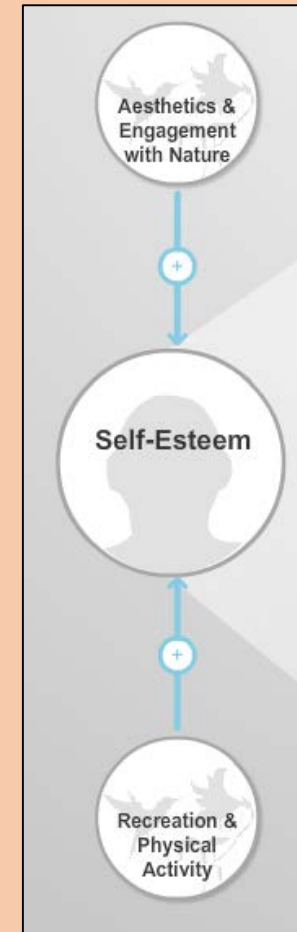
RESPIRATORY SYMPTOMS / RECREATION & PHYSICAL ACTIVITY: Children who played in city parks less than 5 hours a week were 52% more likely to be wheezing, coughing, sneezing, etc. (Grazuleviciene et al., 2014; n=1,489, Lithuania).

RESPIRATORY SYMPTOMS / HEAT HAZARD MITIGATION: During a July 2006 heat wave in Portugal, a 1°C increase in average temperature more people than usual went to the hospital because they were having trouble breathing. The greatest number of extra hospital visits happened on the fourth day in a row of extreme heat (Monteiro et al., 2013).

RESPIRATORY SYMPTOMS / AIR QUALITY: If there was more ozone pollution in the air on a spring/summer day, there was a higher risk of going to the hospital for respiratory disease (Burnett et al., 1997; n=16 cities, Canada).

Self-Esteem

- Self-esteem is used to describe a person's overall sense of self-worth or personal value.
- Many experts think self-esteem is a big part of human existence and plays an important role in how a person feels about themselves.



Self-Esteem: Eco-Health Connections

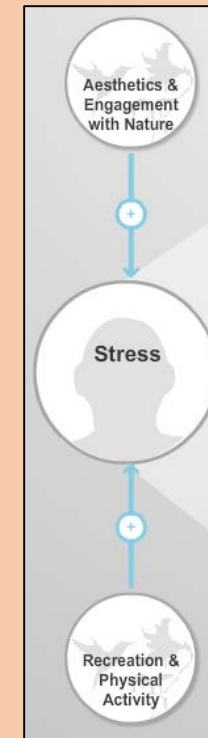
Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

SELF-ESTEEM / AESTHETICS & ENGAGEMENT WITH NATURE: Exercising and walking outdoors, and even viewing pictures of nature, can significantly improve self-esteem. People who exercised in green spaces reported a 9% improvement in self-esteem after the activity (Pretty et al., 2005; n=263, UK).

SELF-ESTEEM / RECREATION & PHYSICAL ACTIVITY: Participating in physical activity can improve self-esteem. Scientists found that exercising in green spaces improved both self-esteem and mood. This improvement increased with the presence of water and was true regardless of how long or how hard the people exercised. (Barton and Pretty 2010; n=1,252, UK).

Stress

- Stress is a normal feeling that can happen because of an event or thought that makes people upset or nervous.
- While some stress is okay, too much stress can have negative health effects, including headaches, muscle pain, and rapid breathing.
- Stress can affect all people, however, women and people who have lower incomes or less education have more stress.



Stress: Eco-Health Connections

Note: This is only a selection of the available evidence. More evidence is available in the Eco-Health tool in EnviroAtlas.

STRESS / AESTHETICS & ENGAGEMENT WITH NATURE: People who visited urban green spaces more often reported lower levels of stress. Also, those who reported wishing to be outdoors in green spaces more often suffered from higher levels of stress (Grahn and Stigsdotter 2003; n=953, Sweden).

STRESS / RECREATION & PHYSICAL ACTIVITY: Study participants felt less stressed after they visited a forest or park. Those who played sports while at the green space were less stressed than those who relaxed or walked (Hansmann et al., 2007, n=164, Switzerland).

Aesthetics & Engagement with Nature

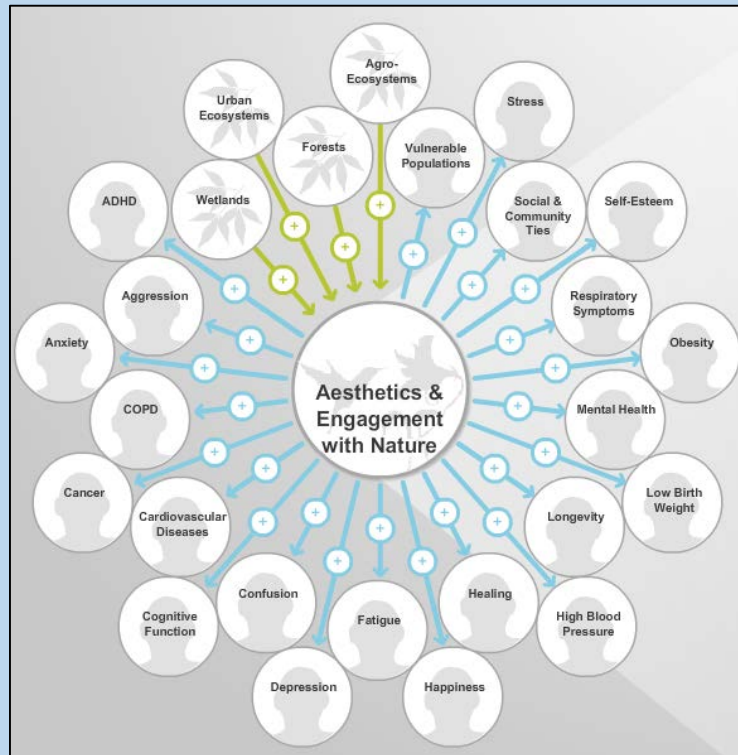
front

- People enjoy spending time outside. Studies show that spending time outside can improve human health and relationships.
- Looking at nature even through a window or photograph can calm anxiety.
- Spending time in green spaces like gardens seems to have health benefits beyond those of outdoor exercise.

All information available from www.epa.gov/EnviroAtlas

Aesthetics & Engagement with Nature

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Air Quality

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- If there is more industry, cities, and cars, there is usually more air pollution.
- Forests and other green spaces can lower the amounts of many air pollutants, including carbon monoxide and ozone.
- Having good air quality reduces the amount of respiratory illness.

Air Quality

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Water Quality

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- Water can be taken up by plants, animals, or soil before it reaches a major body of water.
- Using different types of plants and soil can help stop contamination from reaching water supplies and waters where people might swim or fish.
- Water treatment systems can also reduce pollution and illnesses.

Water Quality

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Heat Hazard Mitigation

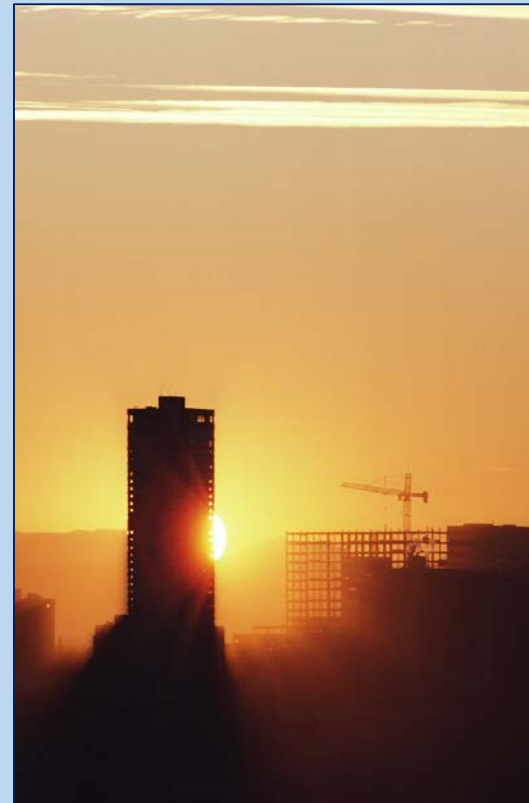
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- The urban heat island effect happens when cities have higher heat in the day and do not cool down at night because dark surfaces like roads take in heat during the day and release it at night.
- Heat waves can cause health issues, especially for older people.
- Green spaces such as street trees, parks, and green roofs can help to prevent urban heat islands.

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Heat Hazard Mitigation

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Recreation & Physical Activity

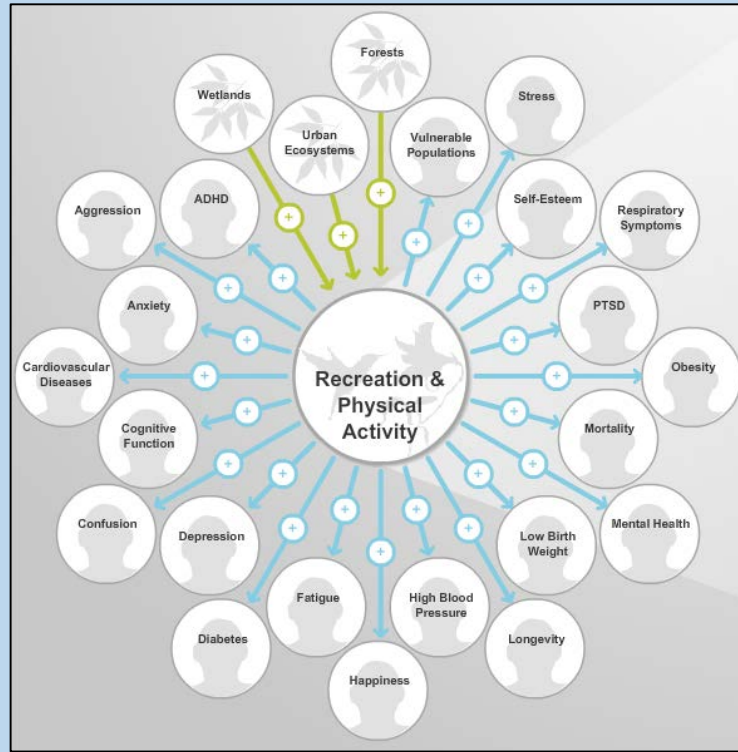
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- Regular physical activity is an important part of a healthy lifestyle and adds to overall well-being.
- Outdoor areas such as parks, forests, and urban green spaces help people to do physical activities such as walking, biking, and exploration.
- Bodies of water also provide opportunities for activities like canoeing, fishing, and water skiing.

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Recreation & Physical Activity

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Water Hazard Mitigation

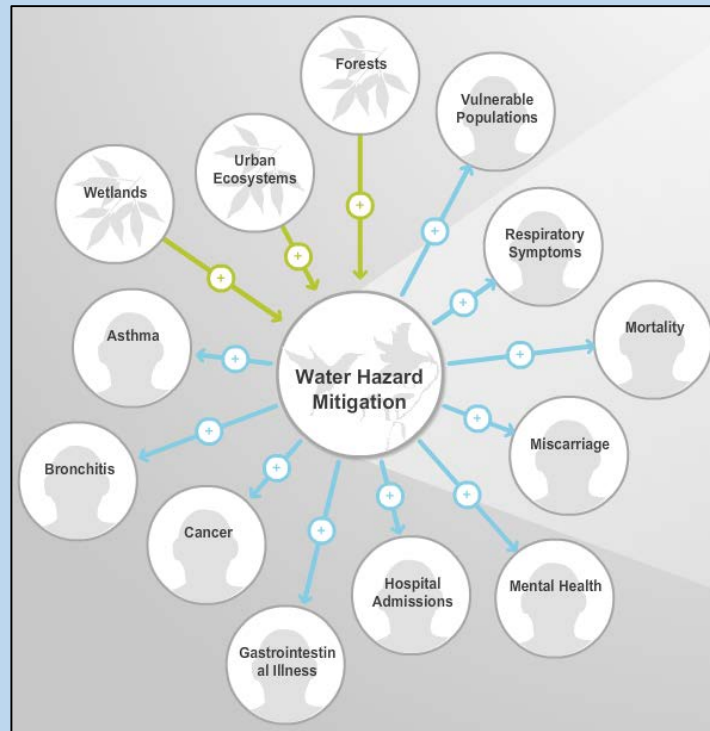
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- Some ecosystems can help reduce the negative effects of extreme precipitation and weather events like thunderstorms, hurricanes, or floods.
- The absence of ecosystems such as wetlands and forests, which help regulate water, may result in more cases of extreme events like flooding, as well as worsen the effects of events like hurricanes.

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Water Hazard Mitigation

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