Sustainable Cities

Goal: What makes a sustainable city? (Food, water, energy, environment, pollution, populations).

What’s the growth of cities? How do cities grow? – what events lead to growth

How to make cities more sustainable.

Alternative ways of living / incentives

What are sustainable communities vs sustainable environments

|  |  |
| --- | --- |
| Topic | Ideas |
| Food | Production, shipping to location, number of |
| Water |  |
| Energy |  |
| Environment |  |
| Pollution | Air, industry, car, |
| Populations | Accessibility to food, history of water, transportation sources  Number of trashcans |

Find cities

* Economic differences throughout
* Different road systems (transportation networks)
* Infrastructure

\*GIS is a geographic system that uses land to convey information. To make accurate conclusions about the geographic data, the cities be compared by region for a more well-rounded view of cities successes and fails.

* Coastal vs. Inland

\*Coastal: tides and coastal barriers. Are barriers (sand, bushes, rocks) protecting shore

1. **Introduction**

* Why is this relevant
  + [**https://www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/16-00055K\_Why-it-Matters\_Goal-11\_Cities\_2p.pdf**](https://www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/16-00055K_Why-it-Matters_Goal-11_Cities_2p.pdf)
* Natural resources

Cities are 3% of the world’s land area, but half of the world’s population – 3.5 billion people – live in these locations, consume 60-80% of energy produced, and account for 75% of carbon emissions2.

1. **Sustainable Cities**

Sustainable cities are usually slow developing areas. They take into account four main concepts: energy and materials, socio-cultural features, urban planning and transport, and water and biodiversity. Three things are taken into account normally when ranking cities: environmental impact (resource use/pollution), quality of life, and preparation for the future3.

Characteristics of Sustainable/Unsustainable Cities

Notes:

[Resource: 13] 4

@3:00 <http://live.worldbank.org/what-makes-a-sustainable-city>

[Resource: 14] 5

<https://cleantechnica.com/2015/01/02/makes-sustainable-city-thoughts-key-components-future-sustainable-cities/>

Own thoughts: What to create a realistic analysis and feasible conclusion about cities. cities are centered around the idea of productivity and efficiency. Building a resilient community. Increasing self sufficiency

Goal:

* don’t exhaust resources
* provide for itself (food production, electricity production, clean water, transportation, etc)
* Issue: technologies have mined resources

How to address issues

1. Localized food production

Growing highly productive crops, soil preserving and erosion diminishing practices, water recycling

Having food grown locally (in the imitate surroundings of a city) will reduce transportation costs and environmental effects of transportation.

Fertilizers

Phosphorus

Collect fertilizers from local industries like animal husbandry, instead of imported fertilizers. Collected fertilizers from fish and other farms can reduce transportation costs and use existing resources, without importing industrially-produced fertilizers.

1. Building Design

Take into consideration the city as a system and how the buildings work and interact with each other.

Have enough roof space facing the direction where the most sun can be collected by solar panels.

With incorporated city system thinking, it can reduce heating and cooling cost. Reduce the net energy consumptions of the city. Note: in world war 1 day light saving was created to efficiently use the day light during the work day and encourage people to turn off their lights to save energy during the war. Energy conservation techniques:

* Dark colors that absorb light and heat in the colder parts of the globe - farthest north and south regions.
* Light Colors that reflect the light and heat in the summer and warmer areas.
* Narrow streets in hot climates

1. Localized energy production

All cities require reliable energy production.

Different areas can harness energy in different ways. Solar, hydroelectric, wind energy, biogas, marine energy technologies

Also need an improvement of energy storage spaces. Incentives for people to use more sustainable and renewable energy sources.

1. Public transportation, livable city centers

Walking in easy/enjoyable will encourage individual cars off the roads. When cities move away from automobile centered city designs to walkable and public transportation designs, then air pollution and public health can improves.

1. Localized resources extraction and reliance

[Resource: 15] 6

<https://www.coursera.org/learn/sustainable-development/lecture/1wUit/what-makes-a-city-sustainable>

[Resource: 16] 2

<https://www.un.org/sustainabledevelopment/sustainablecities/>

Goals: Inclusive, safe, resilient, and sustainable

* Not strain the land
* Create jobs and prosperity
* Provide cities with basic services, energy, housing, transportation…

Issues: congestion, lack funds, sufficient housing, decline of infrastructure

Cities: culture, commerce, science, productivity, social development

[Resource: 17] 7

<http://www.bbc.co.uk/schools/gcsebitesize/geography/sustainability/sustainable_living_rev1.shtml>

[Resource: 19] 8

<https://www.youtube.com/watch?v=fcDDUSUbq9A>

[Resource: 18] 9

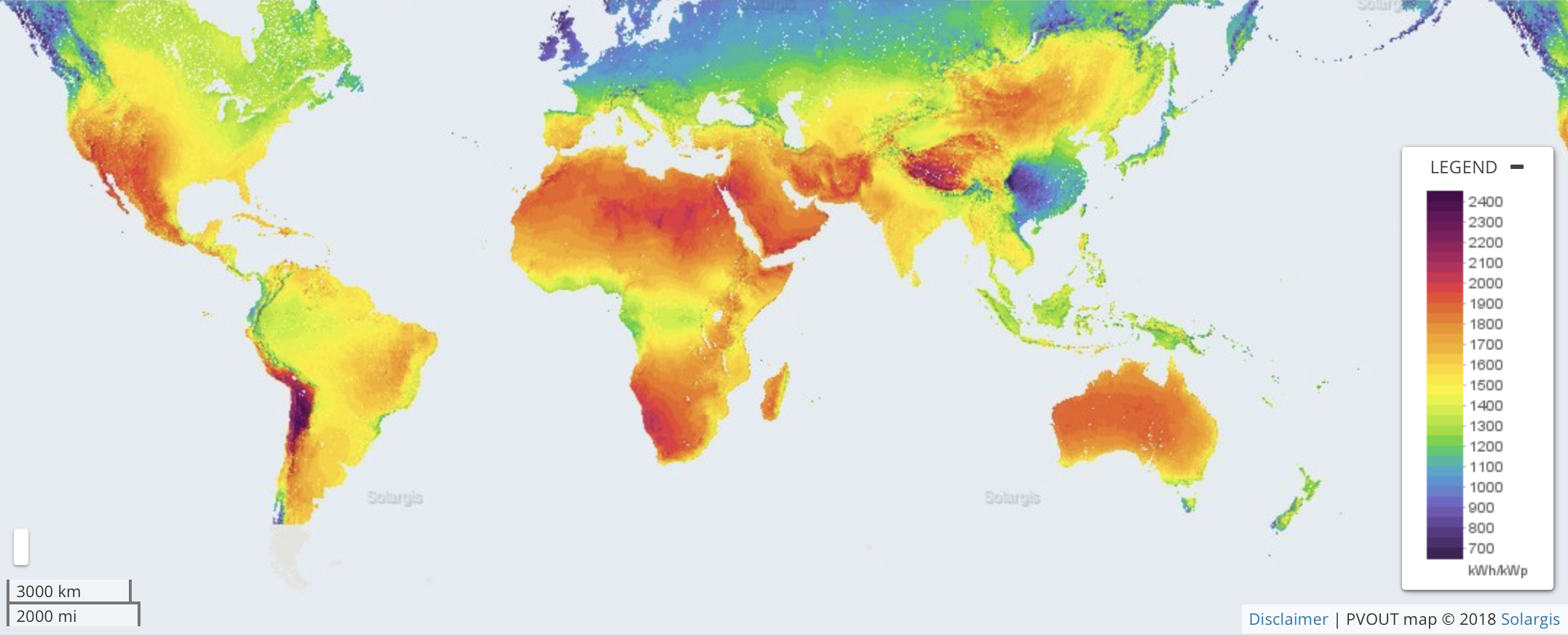
<https://courses.sdgacademy.org/learn/sustainable-cities-april-july-2018>

[Resource: 20] 10

**3.0 Energy**

Energy consumption is an indicator of sustainable cities, but above that is the type of energy harnessed: wind, solar, and hydropower. Many European countries are pioneers in the renewable energy field11. By 2020, Portugal is trying to generate 60% of their power from renewable energy sources11 12. One of the key components of renewable energy is the variable and oscillating generation of power, due to environmental conditions. The time of the year and weather effects the amount of power produced. Water flow (rivers, tides, dams), solar accessibility, and wind availability aren’t constantly producing power. So, one of the main components Portugal is looking at is energy improvements11 12. The system for energy storage has been based off of energy sources that burned as needed, like fossil fuels. Systems are not prepared to accumulate a surplus, which is the direction that needs to be taken with renewable energies.

Globally, there has been a shift to invest in sustainable energy initiatives. China, India, Costa Risa, Scotland, Denmark, and Norway all have made steps to adopt more sustainable practices.



Figure\_: The sunlight harnessing potential across the globe13 14

**4.0 Policy**

Policy changes are integral in creating a mass movement towards sustainable actions.

* The Paris Climate Agreement
  + Keep global temperatures from exceeding 1.5 degrees Celsius
  + Improve solar technology, reduce industry costs, increase solar production in the Global South, which receives little investment for that amount sun light available to be harnessed15
* Making sustainable options cheaper
* Habitat III2 16
  + From the United Nations Conference on Housing and Sustainable Urban Development
  + With a 2030 Agenda to meet Sustainable Development Goals and the Paris Agreement on climate change
  + Targets (by 2030)

Key words: adequate, safe, affordable, accessible, sustainable

Housing, transportation

* World Urban Forum (WUF9) <https://www.un.org/sustainabledevelopment/blog/2018/02/well-planned-managed-cities-can-drive-sustainable-development-un-agency-chief/>
* New Urban Agenda <http://habitat3.org/the-new-urban-agenda/>

**5.0 Cities to Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Region17 | City (Sustainable) | Reason | City (Unsustainable) |  |
| Northeast | Boston18  New York, New York19 | High profit index, solar energy, bike-friendly, LED traffic lights 20 |  |  |
| Mid-West | Chicago20, IL  Columbus, OH20 | High profit index. Green roofs20  Bike-friendliness20 | Cleveland, OH | Transportation |
| West | Portland, OR  Oakland, CA20  Denver, CO | Suppressing greenhouse-gas emissions  Turn around city.  Reduce water consumption, bike-sharing, composting, parks | Las Vagus  Phoenix, Arizona  Los Angeles | -j  -  - smog, congestion |
| South | Dallas20 | energy, transportation | New Orleans |  |

Detroit

Pittsburgh

With policies in place and plans to move into a more sustainable future, countries set goals to mitigate anthropogenic effects.

Examples:

* + China cut coal consumption in half since 201321 22. With $361 billion dollars, by 2020, the country is investing in solar plants, wind farms, hydro sites, and geothermal power. Even with the projected plan, coal will still produce 85% of the country’s energy21.

Economic hot spots vs sustainability

**6.0 Conclusion**

**6.1 City Analysis**

Analysis focus right now: populations, immigration, roadways

Different ways of analyzing sustainable cities.

Environmental Impact

1. Record the use of household products
   1. Laundry/Dish detergents, single use coffee Rod machines, tea bags, disposable wipes, plastic cling wrap/aluminum foil23
2. Which cities have energy coming from renewable energy (solar, wind, hydropower)
   1. Electricity grids
   2. Energy storage
3. Locations in in US to harness renewable energy
   1. Solar patches
   2. Currents (ocean tides, rivers)
   3. Wind farms
      1. Look into where they are currently
4. Road hub and buffer to parks
5. Proximity to food

Social-Cultural Features (quality of life)

1. Women’s health care
2. Gun violence
3. LGBTQ acceptability
4. Homelessness crisis
   1. Seattle

Preparation for the Future

1. Policy change
   1. Quotas
   2. Deadlines (by 2020 by % sustainable)

**6.2 Data Collection**

Notes from WORLD FACT Book ((Done by country) not much break down by state)

Geography

* Land use (agricultural, forest, other) 🡪 sociologically the land use is an indicator of population success

People and society

* Populations
* Ethnic groups
* Languages
* Religions
* Age structure
* Dependency rations
* Net migration rate
* Urbanization (urban population, rate of urbanization
  + Has cities
* Sex ratio
* Mother’s mean age at first birth
* Maternal mortality ratio
* Infant mortality rate
* Physicians density
* Drinking water sources
* Unemployment

Economy

* GDP (gross domestic income) composition by sector of origin
  + Agriculture, industry, services
  + PRODUCTS
* Labor force – by occupation

Energy

* Electricity production / consumption
* Electricity export / imports
* Electricity from
  + Fossil fuels
  + Nuclear fuels
  + Hydroelectric plants
  + Other renewable sources
* Carbon dioxide emission from consumption of energy

Things to take into consideration. Places that experience more natural disasters are more economically and socially vulnerable. Therefore these countries focus more on rebuilding and surviving, then on sustainable efforts.

**6.3 Other World Examples of Sustainable adapting to Sustainable worlds**

European Examples

What is Europe doing

* Barcelona (city blocking)
* Paris (building height limit)

THINGS TO LEARN

* QGIS how to display different views of the earth

Key words to search:

* Renewable energy
* Green industries
* Sustainability (citizen, city)

Resources to go over still

Renewable

* <https://www.globalcitizen.org/en/content/sustainable-energy-un-fossil-fuels-cost/>
* <https://www.politico.eu/article/portugal-looks-to-free-its-stranded-renewables-wind-solar-energy-subsidies-european-union/>
* <https://www.globalcitizen.org/en/content/scotland-renewable-energy/>
* <https://www.globalcitizen.org/en/content/costa-rica-renewable-energy-300-days-2017/>
* <https://www.theguardian.com/news/2016/dec/26/this-is-possible-we-did-it-the-week-portugal-ran-on-renewables>
* <https://qz.com/1245048/portugal-generated-enough-renewable-energy-to-power-the-whole-country-in-march/>
* <https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/renewable-energy/solar-energy.html>

CITES

* <https://www.arcadis.com/en/global/our-perspectives/sustainable-cities-mobility-index-2017/>
* <https://www.arcadis.com/assets/images/sustainable-cities-mobility-index_spreads.pdf>
* <https://www.arcadis.com/assets/images/sustainable-cities-mobility-index_spreads.pdf>
* <https://www.vox.com/culture/2018/4/5/17192874/female-persuasion-meg-wolitzer-review>
* <https://www.globalcitizen.org/en/content/detroit-water-shutdown-thousands-poor/?utm_source=facebook&utm_medium=social&utm_content=global&utm_campaign=general-content&linkId=50102207>
* <https://www.globalcitizen.org/en/content/us-crises-water-flint-modesto-fracking/>
* <http://live.worldbank.org/what-makes-a-sustainable-city>
* <http://billmoyers.com/content/12-cities-leading-the-way-in-sustainability/>
* <https://www.rand.org/pubs/monograph_reports/MR855/mr855.ch5.html>
* <http://www.wri.org/blog/2014/02/sustainable-cities-vision-reality>
* <http://sustainablecities.net/about-us/>
* <https://sustainability.asu.edu/sustainable-cities/>
* <https://sustainability.asu.edu/sustainable-cities/>
* <https://docs.google.com/document/d/1Xrr7zePaEcsu8L7W7Fl5E6GR0-4pYNPP8HF5dj5C5tQ/edit>

QGIS

* <http://training.datapolitan.com/qgis-training/Introduction_to_GIS_Fundamentals/#52>
* <https://sophia.smith.edu/gis-modules/>
* <https://www.qgis.org/en/site/>
* <http://datadrivenjournalism.net/featured_projects>
* <http://datadrivenjournalism.net/featured_projects/human_mating_seasons_the_surprising_link_between_your_birthday_birth_place>

Pollution/ sustainable gone wrong / other

* <https://qz.com/1235417/bluegogo-and-didi-what-happens-when-your-bike-share-company-goes-out-of-business-in-china/>
* <https://qz.com/1234012/we-cant-engineer-our-way-out-of-an-impending-water-scarcity-epidemic/>
* <https://www.vox.com/policy-and-politics/2018/3/22/17146534/millennial-gender-gap-partisan>
* <https://www.npr.org/sections/parallels/2018/03/30/593979013/in-denmark-s-plan-to-rid-country-of-ghettos-some-immigrants-hear-go-home>
* <https://99percentinvisible.org/article/civic-superblocks-barcelonas-urban-redesign-returns-streets-residents/>
* <http://datadrivenjournalism.net/featured_projects/human_mating_seasons_the_surprising_link_between_your_birthday_birth_place>
* <https://www.independent.co.uk/news/world/europe/france-bans-plastic-cups-plates-cutlery-energy-transition-for-green-growth-a7313076.html?cmpid=facebook-post>

Cities

<https://en.wikipedia.org/wiki/Curitiba>

Construction influences culture

At the end

* Evaluate cities accessibility and opportunity for
* Evaluate city sustainable
* Quantify

Data: proximity to other urban places (cities, towns, hubs)