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How can we secure safe and healthy water environment?

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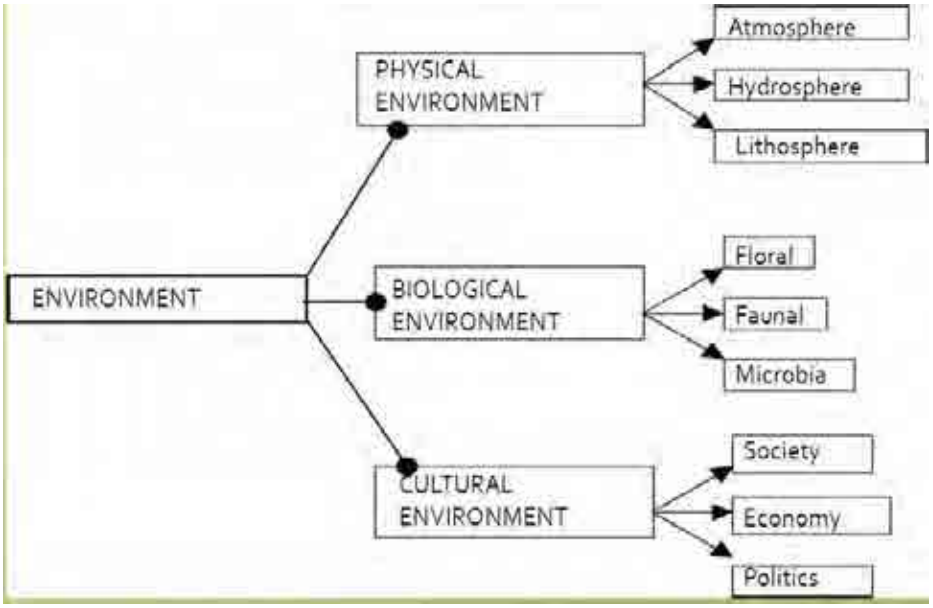
- Discussion topics

What is Water Environment

1. Environment

The environment is everything that makes up our surroundings and affects our ability to live on the earth, the air we breathe, the water that covers most of the earth's surface, the plants and animals around us.



https://www.google.co.jp/search?biw=1280&bih=882&tbm=isch&sa=1&ei=hV7

What is Water Environment

The components of water environments are-

1. Water quality

2. Water quantity

3. Aquatic life

What is Water Environment

2.Water Environment landscape.soilweb.ca/water-environment

A water environment is an environment where plants and animals and microbes interact with the chemical and physical properties of that water environment or,

A water environment is an ecosystem in a body of water where communities of organisms are dependent on each other and on their environment.

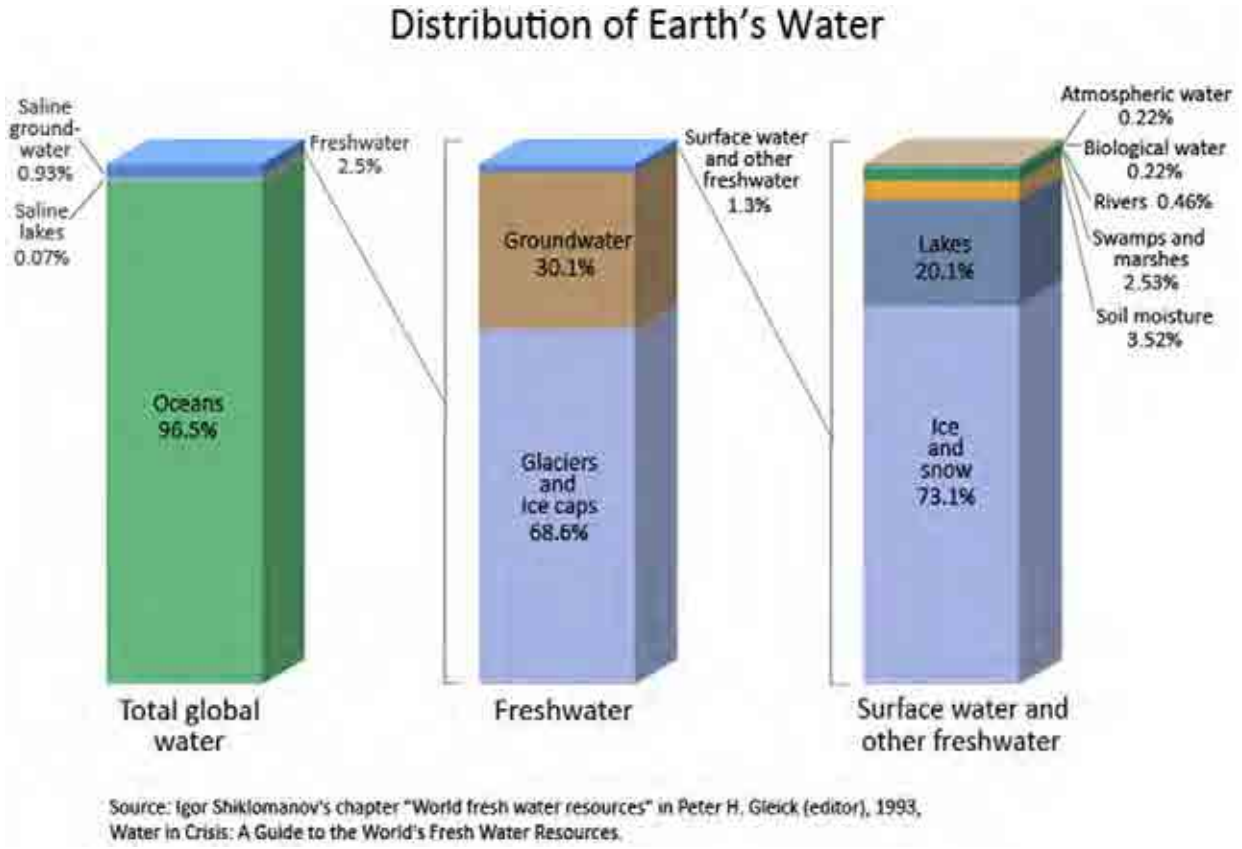
https://en.wikipedia.org/wiki/Water

https://www.google.co.jp/search?biw=1517&bih=641&tbm=isch&s

https://www.google.co.jp/search?q=wetlands&tbm=isch&source

https://swot.jpl.nasa.gov/

Types of water environment



Types of water environment

Large fresh Water environment around the world

- ❖Among the total ice sheet, Antarctic ice sheet holds about 90 percent of the fresh water.
- ❖Among the lakes,

1. the American Great Lakes account for 21 percent fresh water.

2.Lake Baikal in Russia holds about 20 percent of the Earth's unfrozen surface fresh water.

- ❖Lake Victoria, which spreads across the African countries of Kenya, Uganda, and Tanzania, is the second largest freshwater lake in the world by surface area.

https://www.the71percent.org/the-worlds-fresh-water-sources/

Types of water environment

Based on the distribution of water, the two major types are

A . Single water environment

According to salinity there are two types

2. **Fresh water environment**

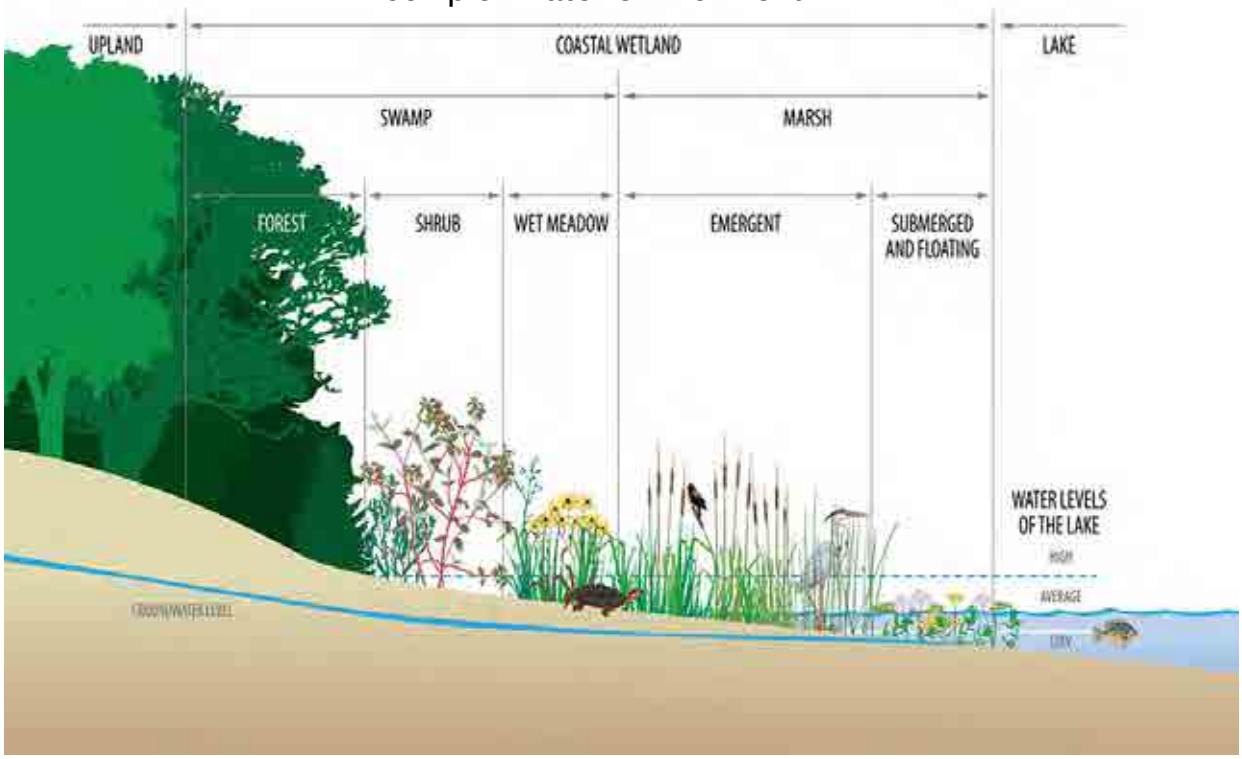
https://www.google.co.jp/search?biw=1504&bih=676&tbm=isch&sa=1&ei=

1. **Marine water environment**

B. **Complex water environment**

Types of water environment

Complex water environment



https://www.google.co.jp/search?biw=1280&bih=882&tbm=isch&sa=1&ei=oWL_W_6

Roles of Water environment

Water environment provides many critical services, such as

- ❖ Serves as water resources
- ❖ Plants (both macro-phytes and algae) carry out photosynthesis & production of oxygen;
- ❖ Bacteria process organic waste products and maintain good water quality;
- ❖ Riparian vegetation mitigates floods and provides more stable river and spring flows;
- ❖ More reliable flow regimes can be utilized for food production, transport, water supply or to support terrestrial ecosystems and wildlife;
- ❖ Healthy ecosystems ensure maintenance of biodiversity and hence resilience to the pressures of utilization.

http://www.thewaterpage.com/aq_eco_july_01.htm

Roles of Water environment

Some roles of particular water environment

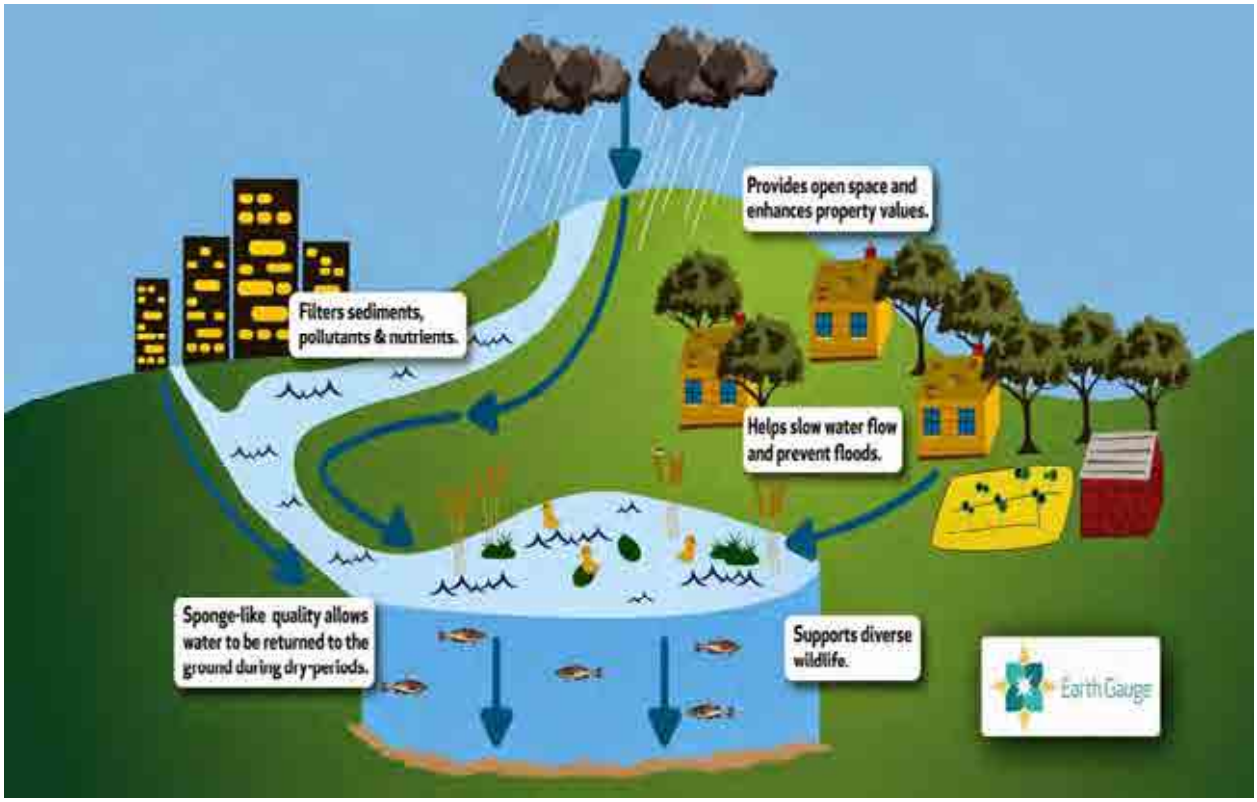
1. Marine water environment

- Oceans and seas are extensive and stable habitats
- All oceans and seas are continuous. They form a largest ecological system.
- The giant reservoir of water – water wealth 97.3 % in oceans and 2.7 % on the land.
- Complex chemical system – 96.6% of seawater is pure water and only 3.4% contain dissolved solids.

- Rich reservoir of carbon dioxide (130 trillion tons : 50 times more than air).
- Richest source of oxygen – replenish the atmospheric oxygen.
- Large reservoir of momentum and energy.
- Mineral wealth – 50 million billion tons.

Roles of Water environment

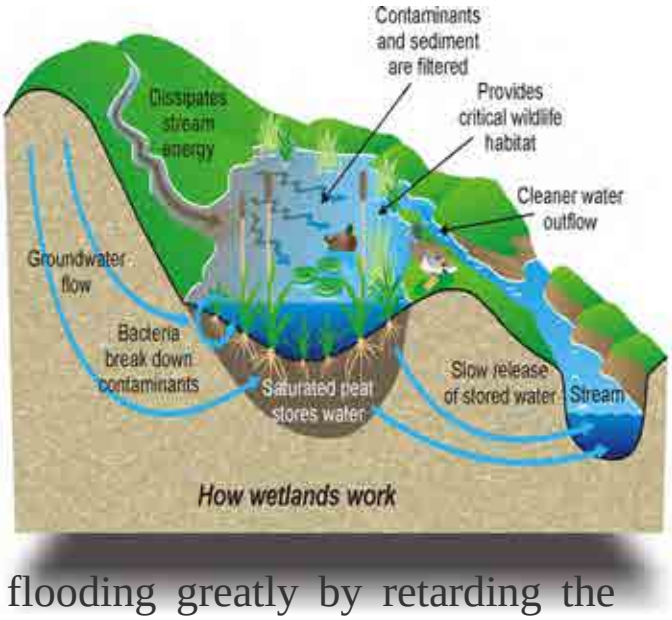
2.Wet land water environment



Roles of Water environment

2.Wet land water environment

In fact, natural wetlands are able to eliminate 20-60% of metal, 70-90% of nitrogenous compounds, and around 90% of sediment from freshwater sources.

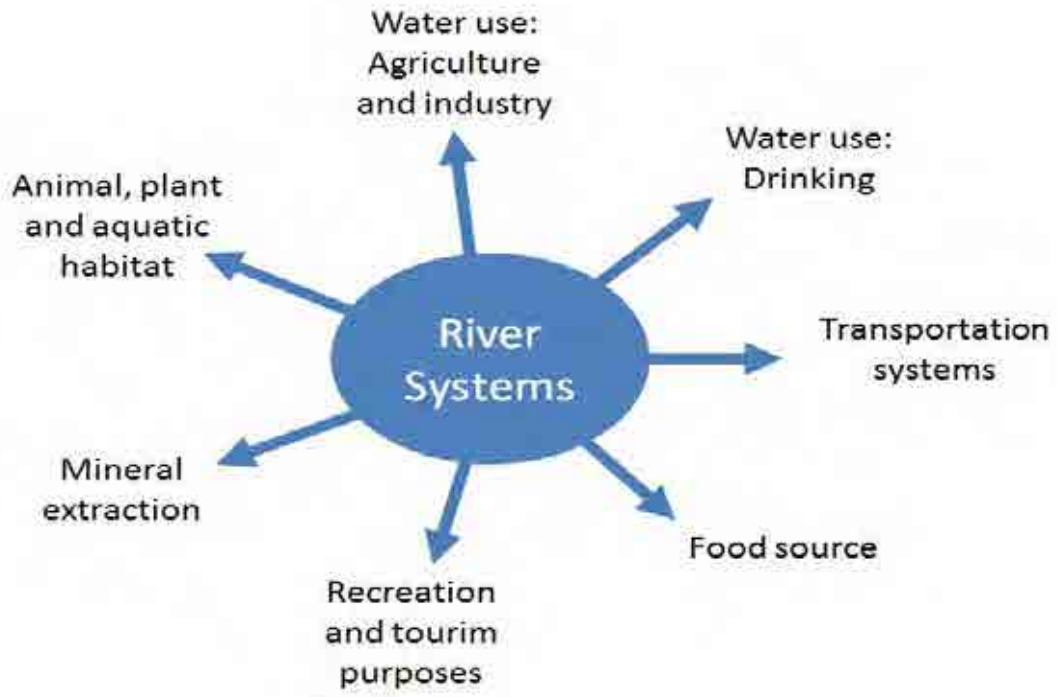


Coastal wetlands, such as saltmarsh and mangroves, are likely to have the highest rates of greenhouse gas capture

Wetlands also reduce the risk of flooding greatly by retarding the movement of floodwaters towards nearby residential areas.

Roles of Water environment

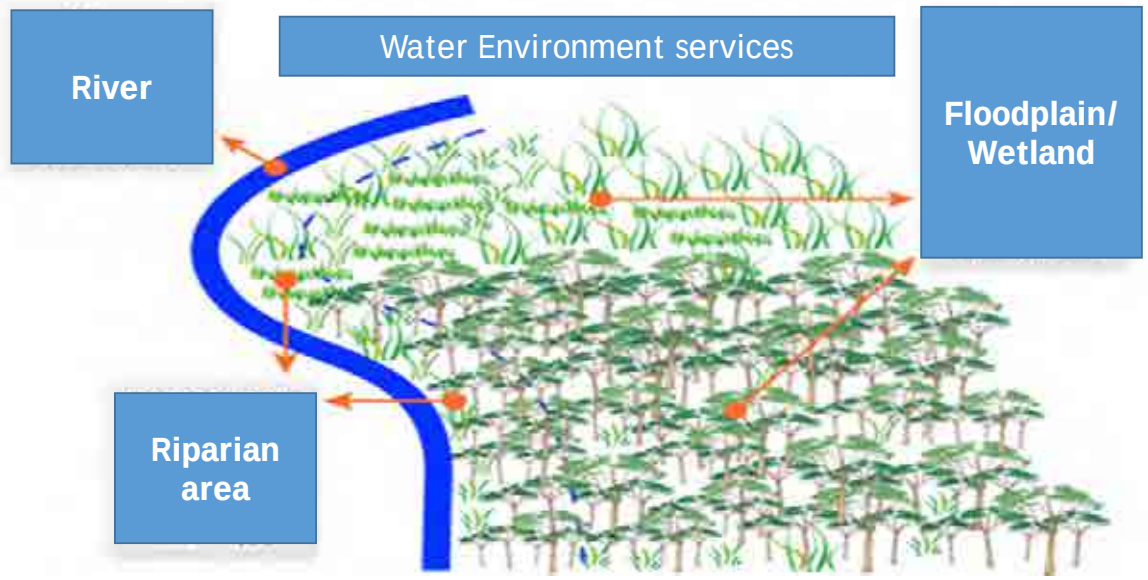
3. River water environment



https://www.google.co.jp/search?q=roles+of+river+ecosystems&tbm=isch&tbs=ri

Roles of Water environment

This schematic provides an overview of the major provisioning regulatory and supporting (e.g. soil formation, nutrient and water cycling) services provided by water environment.



Source: https://phys.org/news/2016-09-reservoirs-substantial-role-global.html#jCp

Water environments evaluation

Commonly evaluated from the following aspects:

- water quality: refers to the chemical, physical, biological, and radiological characteristics of water Index of the nature of water (from Wikipedia)
- water quantity: water amount
- aquatic life: the plants, animals and other organisms that live in the water environment

Especially, water quality and quantity are important factors directly affecting the water use

Water environments evaluation

- Water quality
  - It is necessary to maintain desirable quality in terms of protection of human health, preservation of living environment and conservation of aquatic life.
  - Water quality variables:
    - Dissolved oxygen (DO), Biochemical oxygen demand (BOD), Chemical oxygen demand (COD)
    - pH
    - Coliforms
    - Specific conductance
    - Alkalinity
    - Chloride
    - TN, TP…….

Water environments evaluation

- Water quantity: is the most critical aspects of a water body's health, as without water there are no water environment.
  - **Water volume**: maintain proper volume of water while taking into account conservation of water quality and aquatic life
  - **Water flow**: maintain proper flow rate (neither high nor low)
  - **Groundwater level**: maintain proper groundwater level (to maintain water retention and penetration function of soil)

River is drying up
https://blog.goo.ne.jp/aimutsu/e/6daef1d03c0cf9d7c6b2cd95fe9bc633

Liquefaction phenomenon (High groundwater level)
http://www.city.okazaki.lg.jp/1100/1113/1177/p001667.html

Water environments evaluation

Aquatic life:

- Native species: a species that has been observed in the form of a naturally occurring and self-sustaining population in historical times.
- Invasive species: a species that is not native to a specific location (an introduced species), and that has a tendency to spread to a degree believed to cause damage to the environment, human economy or human health. (from wikipedia)

Invasive species may result in extensive changes in the structure, composition and global distribution of the biota of sites of introduction, leading ultimately to the homogenisation of the world's fauna and flora and the loss of biodiversity

Japanese rice fish
(Native species in Japan)

http://www.kannousuiken-osaka.or.jp/zukan/zukan_database/tansui/8450b2c298b2683/9950b6e7394c5f6.html

Red swamp crawfish
(Invasive species in Japan)

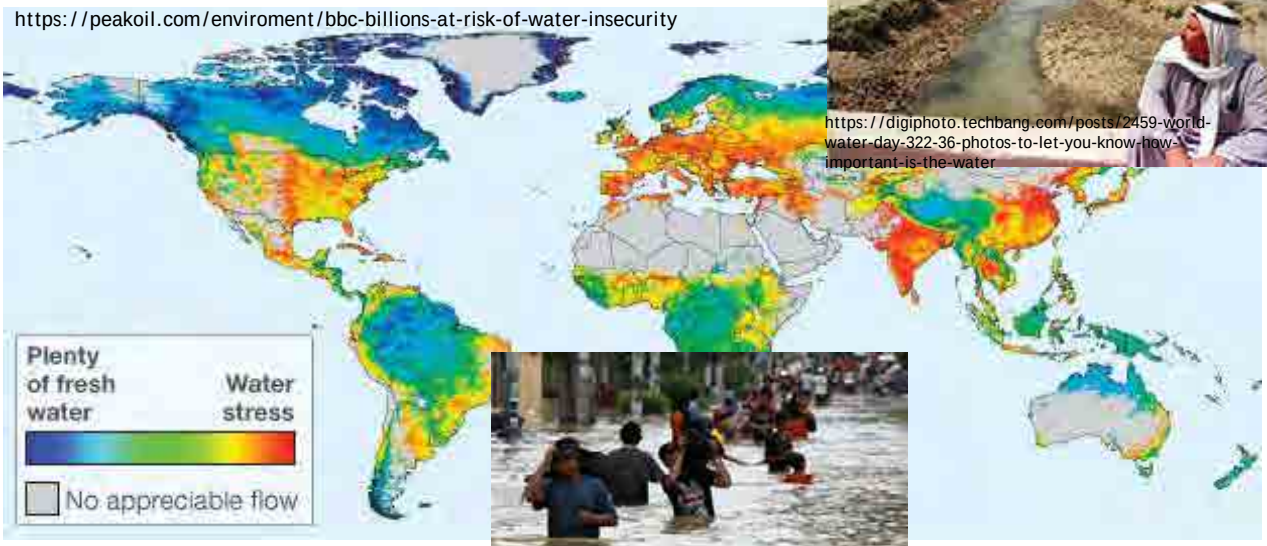
https://news.yahoo.co.jp/byline/ishidamasahiko/20180102-00080025/

Current situation of water environment in the world

Water quantity

Uneven distribution of fresh water

https://peakoil.com/enviroment/bbc-billions-at-risk-of-water-insecurity



Depletion of valuable resources

https://digiphoto.techbang.com/posts/2459-world-water-day-322-36-photos-to-let-you-know-how-important-is-the-water

https://www.cnn.co.jp/world/35027108.html

Destruction of nature

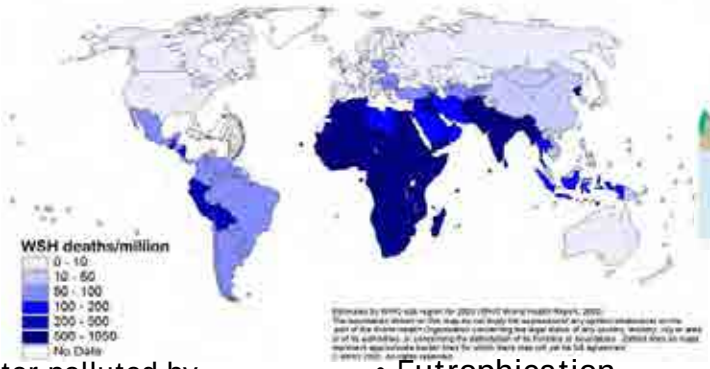
Current situation of water environment in the world

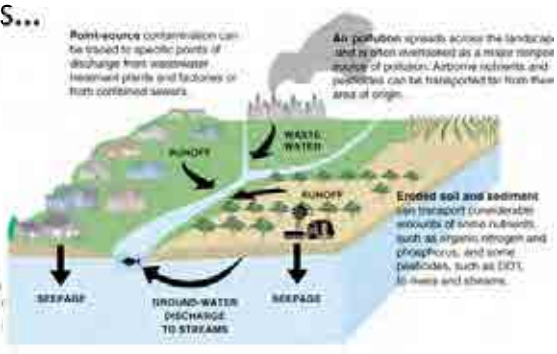
☐ Water quality

Water Pollutants: pathogens (bacteria, viruses…), inorganic materials (heavy metals like As, Hg, Cu, Cd…), organic materials (pesticides, other organic chemicals…), macroscopic pollutants…

Deaths from unsafe water, sanitation and hygiene

http://www.who.int/heli/risks/water/en/wshmap.pdf





• Water polluted by industrial wastewater


https://www.epochtimes.jp/jp/2008/06/print/prt_d96962.html

• Eutrophication


http://www.pollutionissues.com/Ve-Z/Water-Pollution-Freshwater.html


https://www.epochtimes.jp/jp/2008/06/print/prt_d96962.html

Pollutants enter water from point sources, which are readily identifiable and relatively small locations, or nonpoint sources, which are large and more diffuse areas.

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Current situation of water environment in the world

☐ Aquatic life

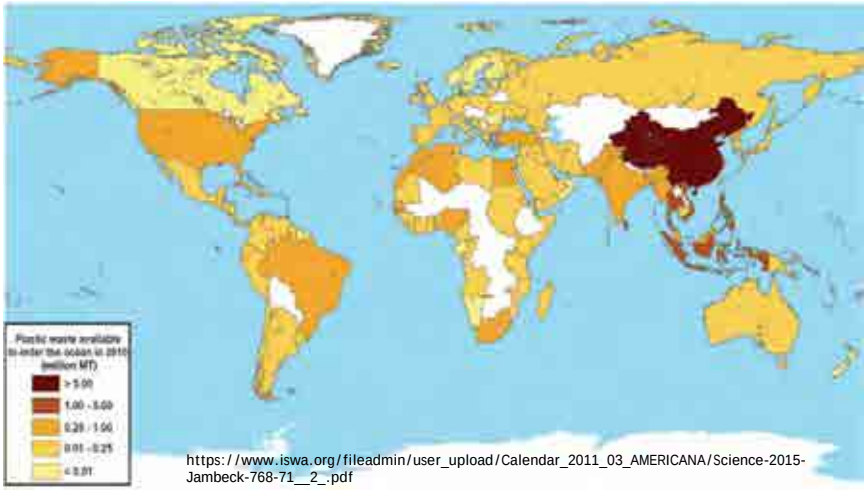
Plastic waste inputs from land into the ocean.

Most of them are leaking from the Asian continent. Large plastic pieces drifting off the ocean have a direct effect on marine life. Also, microplastic with plastic granulation has caused far more complicated types of contamination


https://marineplastic.net/marinedebris


http://blog.livedoor.jp/sagittariun/archives/3673062.html


http://blog.livedoor.jp/sagittariun/archives/3673062.html



https://www.iswa.org/fileadmin/user_upload/Calendar_2011_03_AMERICANA/Science-2015-Jambeck-768-71__2_.pdf

Concrete examples of securing safe and healthy water environments (in Bangladesh, Switzerland and Japan)

Water Environments in Bangladesh

Bangladesh The country is bounded by India on the west, the north and the northeast; Myanmar on the southeast and the Bay of Bengal on the south.

In Bangladesh, two type of water environment are present, such as **fresh water** and **saline water.**

www.ruposhibangladesh.com/sylhet-part-2/

The Ganges-Brahmaputra-Meghna river basins (Abu Musa ***et al***.2009)

Problems of water environments

Groundwater is the main source of water supply in urban and rural areas of Bangladesh.

Problems of ground water (BUET, 2004)

- Arsenic in groundwater;
- Excessive dissolved iron;
- Salinity in the shallow aquifers in the coastal areas;
- Lowering of groundwater level;
- Rock/stony layers in hilly areas;

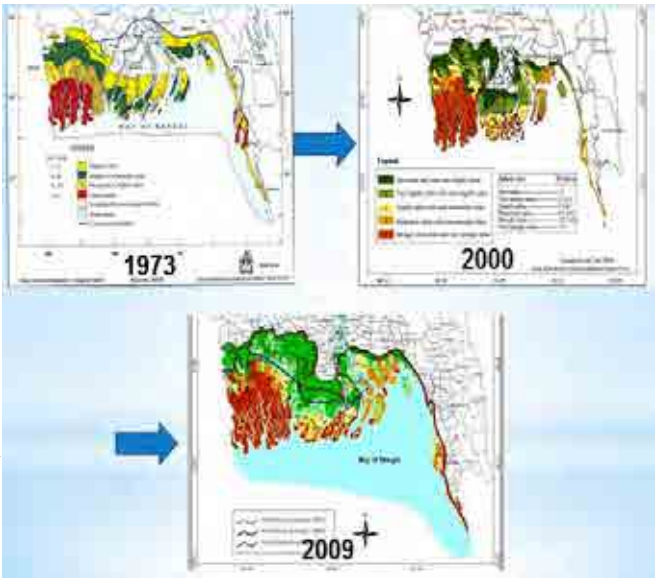
https://www.google.co.jp/search?q=arsenic+problem+in+bd

Problems of water environments

Salinity problem

Bangladesh is highly vulnerable to saline water inundation due to sea level rise. World Bank (2000) showed 10 cm, 25cm and 1.0 m rise in sea level by 2020, 2050 and 2100

SRDI 2010 showed 1.5 m sea level rise in Bangladesh coast by 2030, affecting 22,000 Sq. km (16% of total land mass)



Soil salinity increase over year due to sea level rise (SRDI, 2010)

Solution in Bangladesh

- **Bangladesh Rural Water Supply and Sanitation Project**, to which the World Bank has committed $43 million since 2012, aims to increase a safe water supply and hygienic sanitation in the rural areas
- **Scaling-up MFI lending for improved rural sanitation in Bangladesh**, that promotes sanitation marketing and includes private-sector engagement.
- **The Chittagong Water Supply Improvement and Sanitation Project** ($144 million from the Bank for Fiscal Year 2011 to 2018) is supporting to increase the sustainable access to safe water and improved sanitation, river and cannels utilization
- **Dhaka Water Supply and Sanitation Project for Bangladesh** during Fiscal Years 2009 to 2016**,** which supported the improvement of storm-water drainage in select catchments in Dhaka, and DWASA's planning capacity in the areas of sanitation and drainage.

http://www.worldbank.org/en/results/2016/10/07/bangladesh-improving-water-supply-and-sanitation

Solutions in Bangladesh

Sheikh Hasina Water Treatment Plant" in 2017(previously named as Karnaphuli Water Treatment Plant).has the capacity to treat 143 million liters of water daily. Able to meet nearly 70% of the demand," Chittagong Water Supply and also releases treated water in Karnaphuli river.

https://www.dhakatribune.com/bangladesh/2017/03/11/chittagongs-first-water-treatment-plant-ready-inauguration

Solutions in Bangladesh

Constructed Year	2002 Phase-1 capacity 225,000 m^3/d 2012 Phase-2 capacity 225,000 m^3/d
Water Source	Sitalakhya River
No of Connection	About 230,000 connections including bulk connections to multi-storied apartment buildings.
Peak Operating Flow (m^3/d)	450,000 m^3/d
Design capacity (MLD)	450,000 m^3/d
Automation	Yes, operations automated
No. of employees	100
Date of access of the source information	2016
References	Water Supply Master Plan for Dhaka city, 2015 and personal communication with DWASA staff

http://www.jwrc-net.or.jp/aswin/en/newtap/report/NewTap_037.pdf

Future prospects of securing water environment in Bangladesh

Water Resources Planning Organization (WARPO) is an organization, which was created to perform planning of water resources by:

- Preparing environmentally compatible master plan for water environment development.
- Formulating strategy and policy for scientific utilization and conservation of water environment.
- Collecting and analyzing data and information on particular water environment and arrange for dissemination.

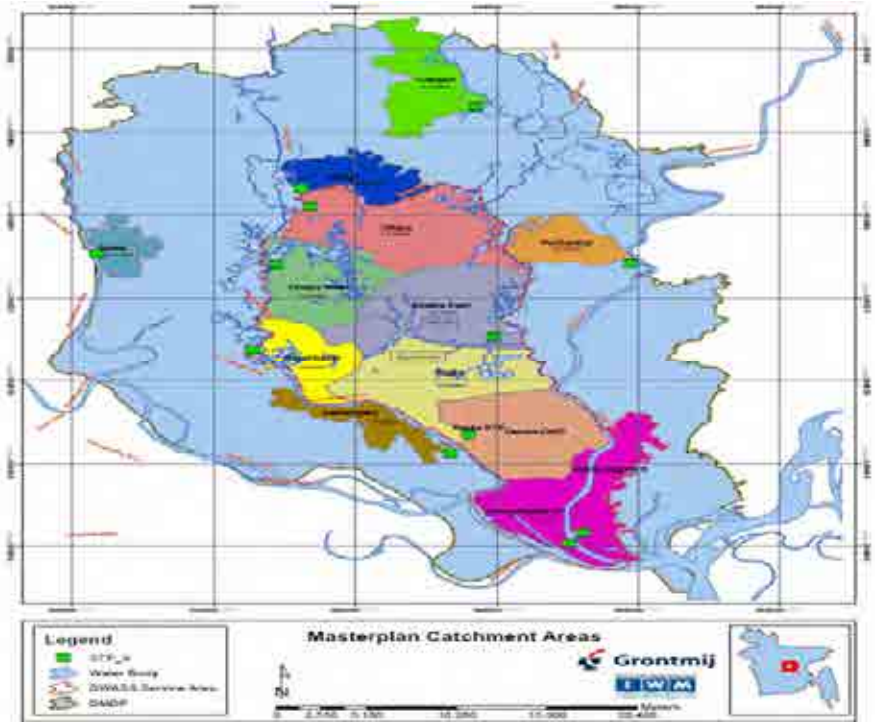
Future prospects of securing water environment in Bangladesh

Veolia and Suez will design, build and operate a new drinking water production facility that will take water from the Meghna River 22 km upstream of the plant. Located in the district of Gandharbpur, the plant will produce 500,000 m^3 of water per day to supply 4.3 million people with drinking water with no contamination and release treated water in Meghna river river.

https://www.veolia.com/en/newsroom/news/drinking-water-production-dhaka-bangladesh-veolia-suez

Future prospects of securing water environment in Bangladesh

The attached figure indicates the proposed catchment boundaries and location of primary infrastructure, including trunk sewers, main pump stations and wastewater treatment plants (trickling filter process). Plan to complete in 2035.



Water environment in Switzerland

- Switzerland is one of the exemplary countries for water quality.
- In Switzerland today, river and lake are very beautiful.
- It rains a lot in Switzerland and Switzerland is rich in water.
- People can directly drink water from the fountain in the city.

https://www.swissinfo.ch/image/42271546/3x2/640/426/494e7319f745d37efc5e8662abf16f68/RV/bruecke-jpg.jpg

https://img.myswitzerland.com/515603/329

Water environment problem in Switzerland

However, just in 1960s, Switzerland's water environment was poor. And sewerage diffusion rate was only about 15% .

- In 1963, typhus occurred in the sightseeing area Zermatt. 3 dead and more than 450 got sick.

☐ Cause: most of wastewater was discharged directly into rivers and lakes.

☐ Solutions

- The government made great efforts to improve sewerage.
- Sewerage diffusion rate: remarkably increased

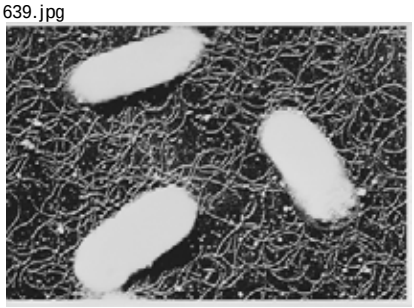
  1960s : about 15%

  ↓

  2005 : 97%

A woman next to a sign written "No swimming" In 1964

https://www.swissinfo.ch/image/43243752/3x2/640/426/4ebfdabd7f75bf83f364acd418aea62/Sv/296462639.jpg



http://www.tokyo-eiken.go.jp/files/lb_shokuhin/tyudoku/typhi/typhoid2.jpg

Future prospects of securing water environment in Switzerland

- Contamination problem by persistent chemicals is a major concern

• Pollutants derived from medicines, pesticide, cosmetics and other chemical products…

• Animals and plants in water environment are seriously affected by the pollutants (fish diseases and infertility have been caused).

Pesticide application
https://www.jica.go.jp/bangladesh/bangland/cases/case26.html

- Solution

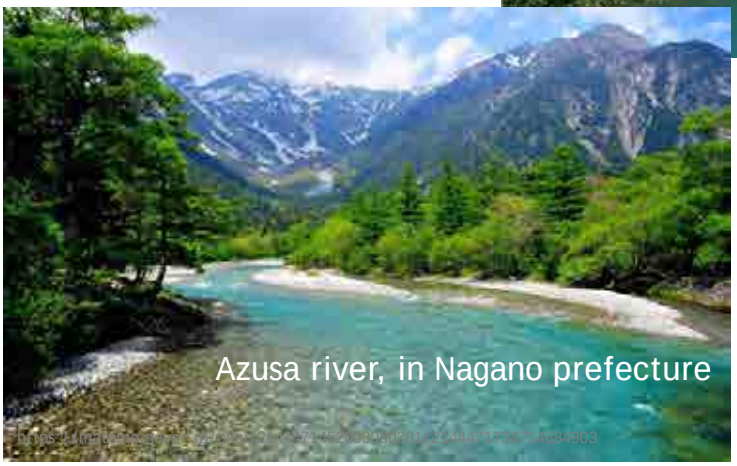
• Switzerland invested about 1 billion franc as a national project.

• Switzerland aims to sequentially introduce trace chemical treatment facilities into domestic main sewage treatment plants by 2040.

Microbeads included in cosmetics etc.
http://www.greenpeace.org/japan/ja/news/blog/staff/blog/58911/

Water environment in Japan

Nagara-river, in Gifu prefecture
https://otsukyon.at.webry.info/201004/article_8.html



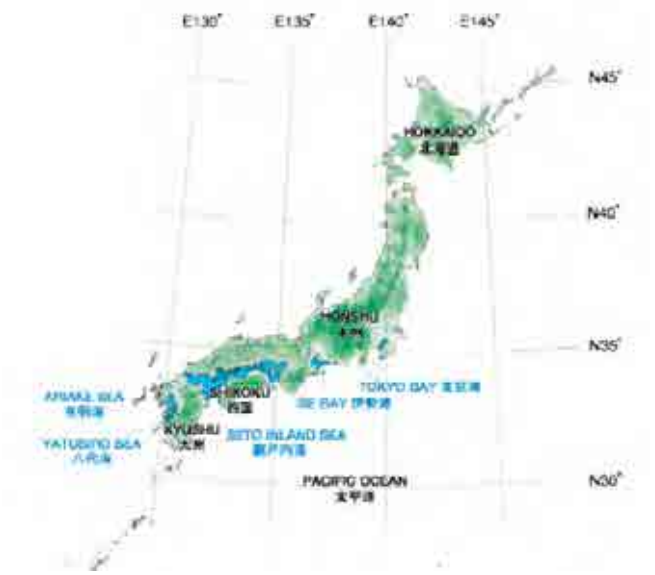
Azusa river, in Nagano prefecture
https://photozou.jp/photo/show/2...

Japan is rich in water resources among the world, depending on its climate and land form.

Water environment problems in Japan

- Red Tide in the Closed Marine Waters

Because Japan is an island country, there are many closed waters. Water pollution by humans can lead to devastating environmental destruction in closed waters where there are few opportunities for water to enter and exit.



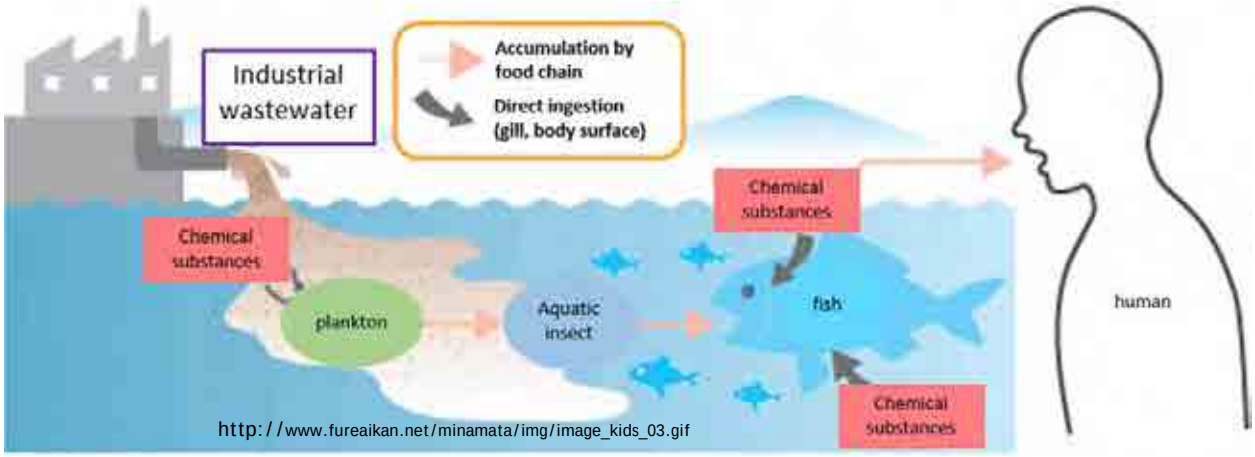
In the Seto Inland Sea, red tide frequently occurred. Red tide has a big impact on fishery

Water environment problems in Japan

- Pollution Diseases by Industrial Wastewater

In Japan's economic growth period, pollution diseases such as Minamata disease (1950s) and Itai-Itai disease (1950s) occurred. The cause is water pollution of rivers and bay due to inflow of industrial wastewater (Methyl mercury and Cadmium).

Harmful chemical substances discharged to the environment are bioaccumulated by the food chain.



Solutions in Japan

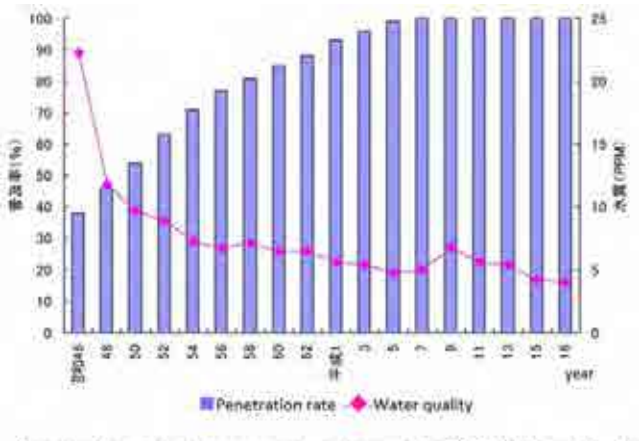
- ✓Establish environmental standards, measure water quality regularly
- ✓Achieve high penetration rate of water supply and sewerage
- ✓Build law for water quality conservation
- ✓Regulate wastewater discharge from factories

Solutions in Japan

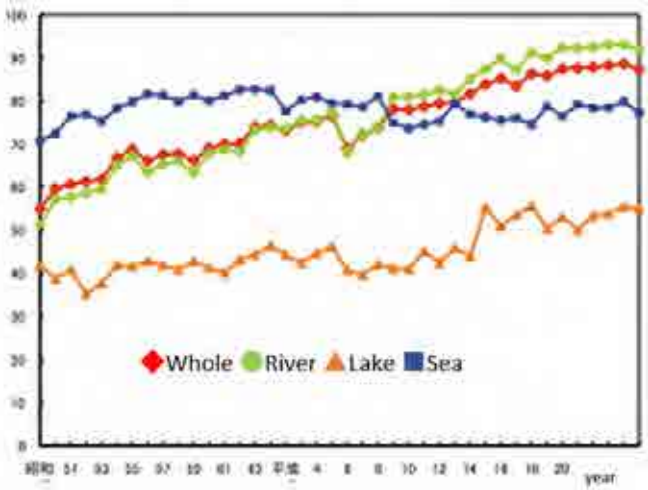
BOD(biochemical oxygen demand)

COD(chemical oxygen demand)

The smaller these values are, the better the water quality is kept.



Penetration rate of sewer and water quality(BOD) of Sumida river

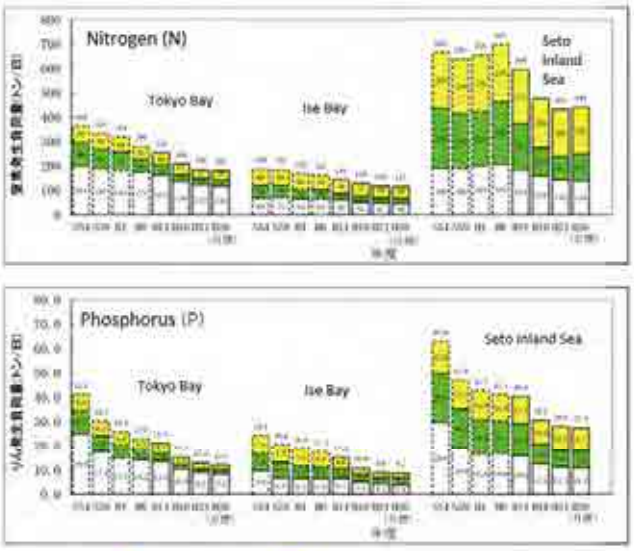


Trend of achievement rate of environmental standards (BOD and COD)

Resource: Ministry of Environment

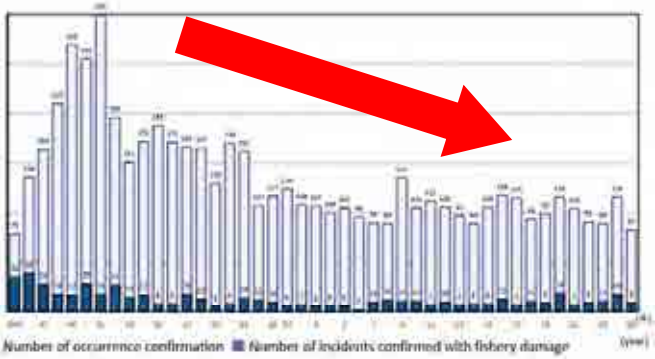
Solutions in Japan

Reduction of phosphorus and nitrogen and the number of occurrences of red tide accompanying them



Transition of pollution burden amount by sea area

Resource; Ministry of Environment

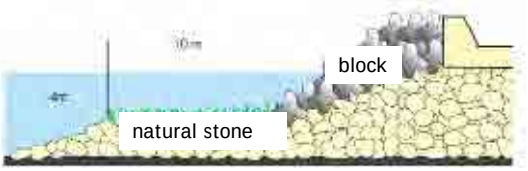


umber of occurrences of red tide in the Seto Inland Sea

Source; Fisheries Agency

Future prospects of securing water environment in Japan

- ✓Promote efforts toward conservation of local water environment.
- ✓Minimize the impact on biodiversity and make efforts aware of biodiversity.



• Environmentally friendly structures using natural stone for the protection of the airport island

At the Chubu International Airport

• Transplanted seaweed and created a habitat for various aquatic life.

Conclusions

- Water is the most important component within water environment.
- There are various water environmental problems such as eutrophication, salt damage, marine plastic, etc..., in the world.
- Evaluation of water quality is necessary for solving the water environment problems.
- We should work with global perspectives on conservation of water environment.

Discussion topics

- Is the water environment in your country safe and healthy?
- What should we do to secure safe and healthy water environment?

Water Environment Under Global Warming

1. Takanori Ishii (M1)
2. Lei Han (M2)
3. Cahyo Wisnu Rubiyanto (M2)

Contents

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- What is Global Warming？
- Global Warming Effects on Water Environment
- Water Environment Under Global Warming in Japan, China and Indonesia
- Conclusion
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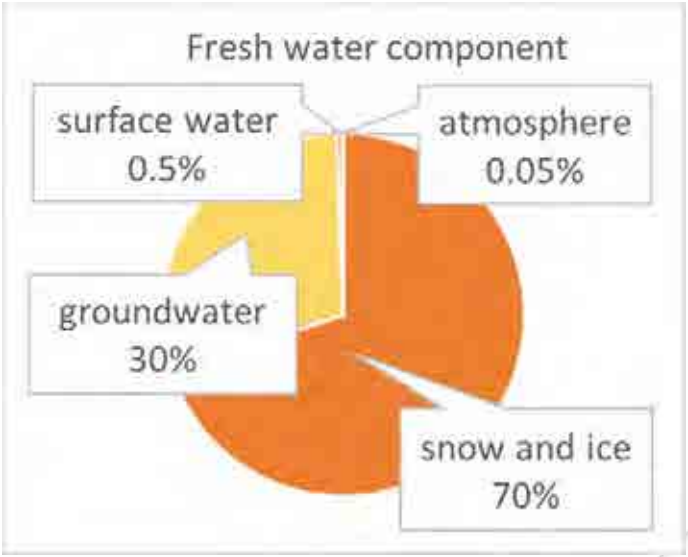
Water sources on Planet



What's Water Environment ?

Water environment is one of the basic elements of the global environment. It is an important place for human society to live and also the most serious area that is disturbed and destroyed by human beings. The pollution and destruction of water environment has become one of the major environmental problems in the world today.

https://best.ca/2013/10/24/being-green-and-blue/

https://baike.baidu.com/item/6070449?fr=aladdin

Water Environment is Important

Healthy water environment support native wildlife and human activities such as the industries, agriculture, fishery, forestry, etc.

Water environment also have great cultural and spiritual significance to the people. These landscapes provide a link to traditional storytelling, beliefs and practices. They are also a rich source of food, medicine and materials for shelter, clothing and tools as part of their living culture.

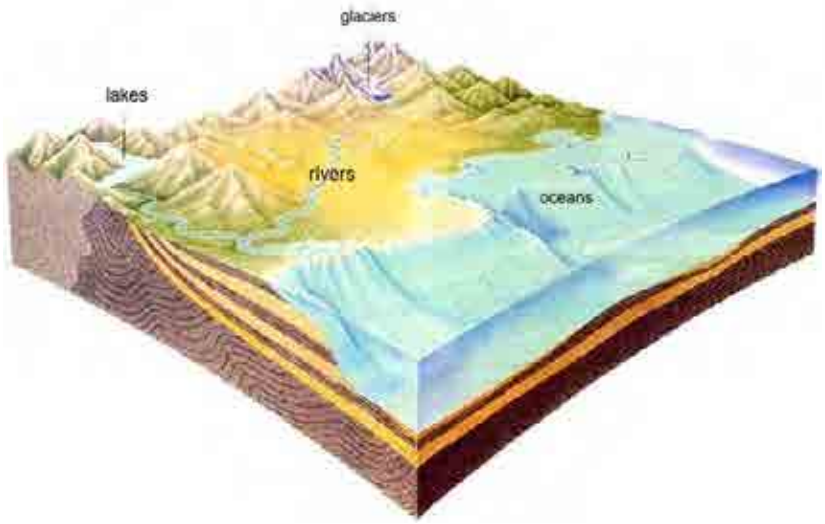
Water Environment

The water environment is mainly composed of two parts: the surface water environment and the groundwater environment.

1. The surface water environment includes rivers, lakes, reservoirs, oceans, ponds, swamps, glaciers and so on.

2. The groundwater environment includes spring water, shallow groundwater, deep groundwater and so on.

The Surface Water

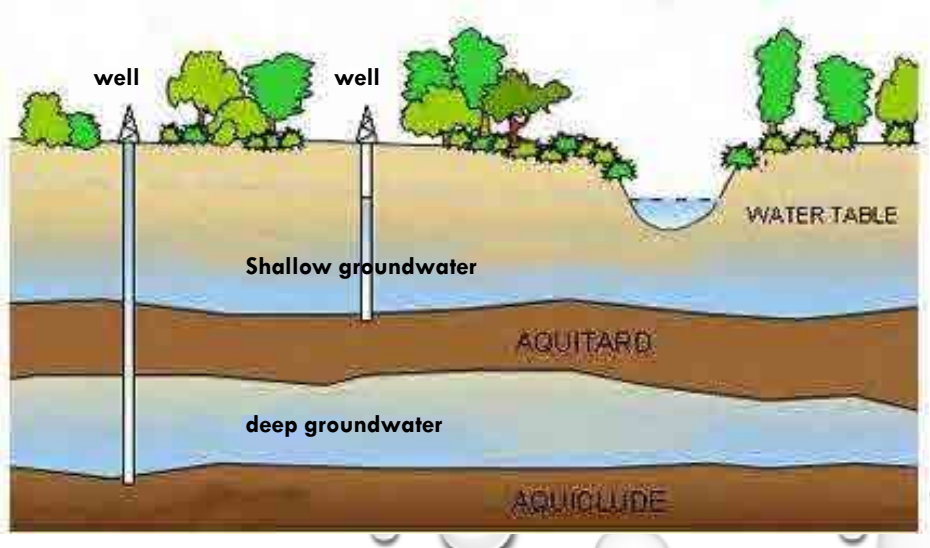


https://image.baidu.com/search/detail?ct=503316480&z=0&

- It is one of the important sources of water for living things.
- It is also a major component of water resources in all countries.

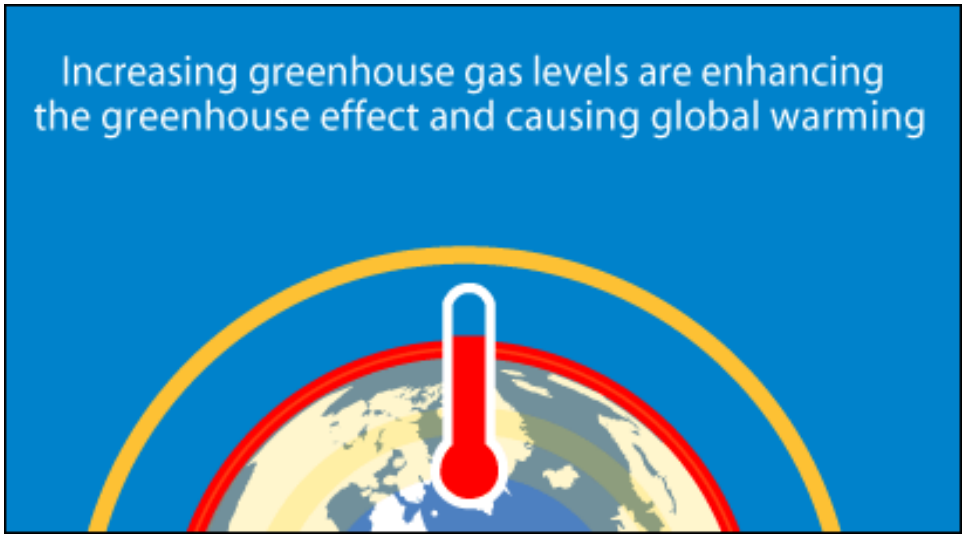
The Groundwater

Due to stable water quality and good water quality, groundwater is one of the important sources of water for agricultural irrigation, mining, and cities.



https://baike.baidu.com/item/6070449?fr=aladdin

What's Global Warming?

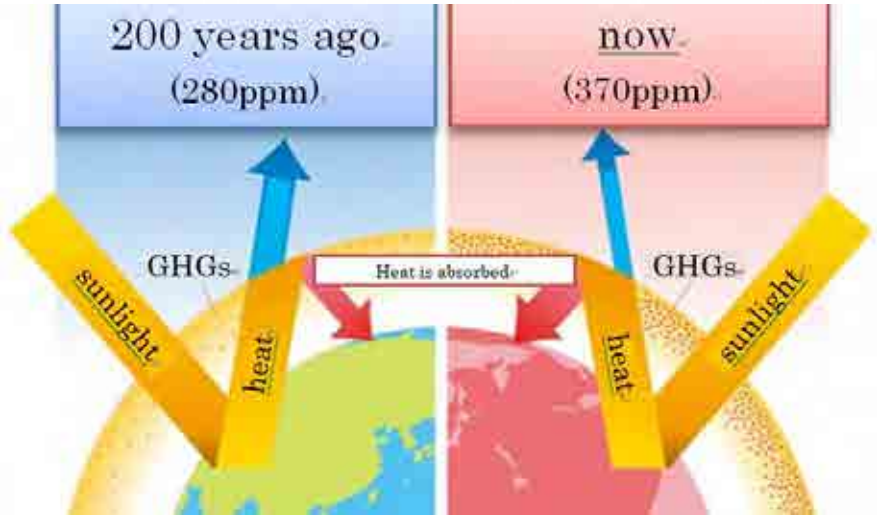


https://whatsyourimpact.org/global-warming

The globe is heating up. Both land and oceans are warmer now than record-keeping began in 1880, and temperatures are still ticking upward. This temperature rise, called global warming.

https://www.livescience.com/37003-global-warming.html

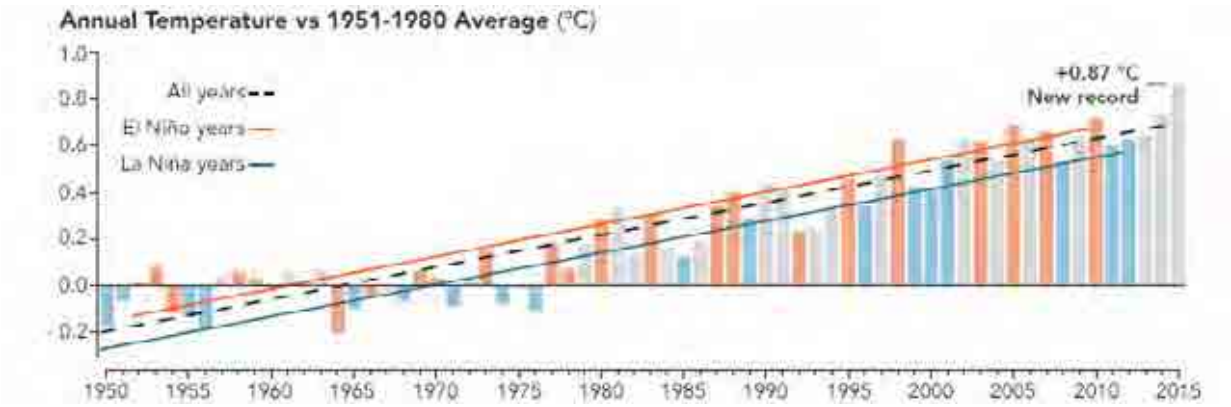
Global Warming Mechanism



https://gifunctitb.wordpress.com/2012/08/14/introduction-2-impact-of-climate-change/

Global warming is primarily a problem a lot of carbon dioxide (CO_2) in the atmosphere—which acts as a blanket, trapping heat and warming the planet. Warmer water in the sea increases the moisture content of storms, and warmer air holds more moisture – and it impacts to the intensity of rainfall.

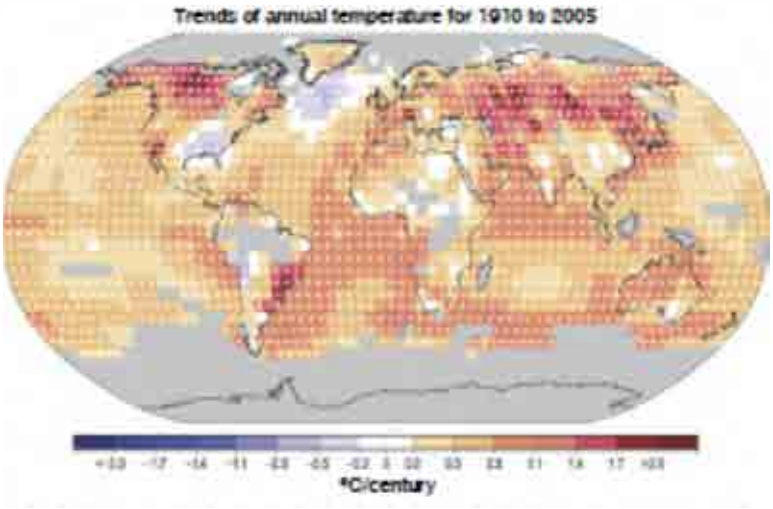
Change of Temperature



https://earthobservatory.nasa.gov/IOTD/view.php?id=87359

Because of global warming, the temperature in the earth is increasing year by year.

Global Warming



https://www.env.go.jp/en/earth/cc/impacts_FY2012.pdf

The global average temperature has been increasing over the long term, and since1891, it has risen at a rate of 0.68℃ per 100 years. The temperature increase is particularly significant at the high latitudes in the northern hemisphere.

Effects of Global Warming

- Global warming will cause melt ice, extreme weather, degraded water quality and water shortage.
- It leads to rise in sea level, not only endangering the balance of natural ecosystems, but also threatening the survival of human beings.

Effects of Global Warming

Melt Ice

With global warming, both of the poles are warming quite quickly, and this warming is causing ice to melt.
When land ice melts, the liquid water flows into the ocean and causes the water levels to rise.

https://www.theguardian.com/environment/climate-consensus-97-per-cent/2018/may/09/global-warming-is-melting-antarctic-ice-from-below

Effects of Global Warming

Extreme Weather - Draught

Due to global warming, some regions are expected to see an increase in the number of days without rain as well as increased occurrences of drought due to decreased snowfall/rainfall.

http://www.gracelinks.org/2380/the-impact-of-climate-change-on-water-resources

Effects of Global Warming

Extreme Weather - Flood

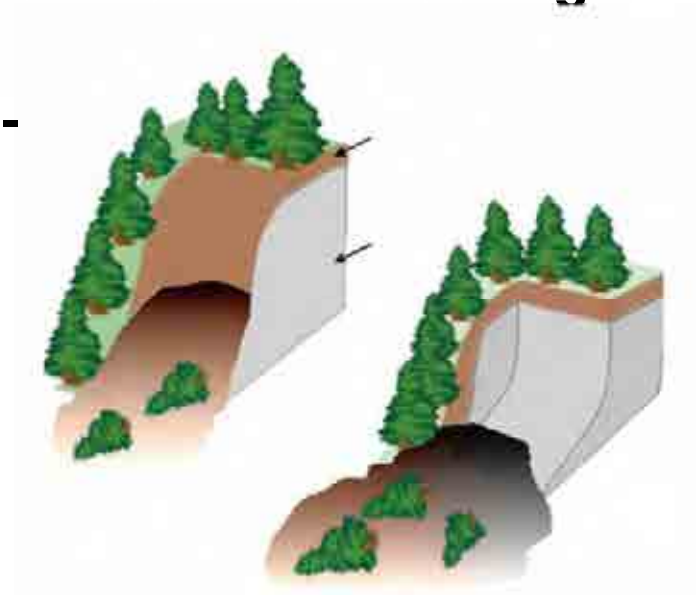
Flooding of the Kumano River (Kiho Town, Minamimuro District, Mie Prefecture) caused by Typhoon No. 12 in 2011c

- The risk of disaster due to heavy rain could also increase.
- Global warming increases the risk of flooding because the amount of rain that can fall during an extreme downpour "increases exponentially" as temperatures rise.
- When more heat-trapping pollutants surround the earth, more moisture is held in the air, leading to more rainfall.

https://www.env.go.jp/en/earth/cc/impacts_FY2012.pdf

Effects of Global Warming

Extreme Weather - Landslide



Due to heavy rain, there is a possibility that the risk of mass movement in mountainous areas will also increase.

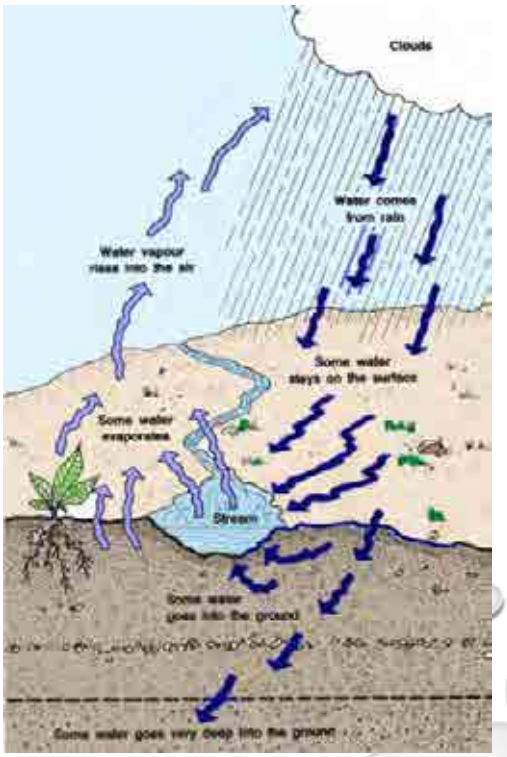
https://www.env.go.jp/en/earth/cc/impacts_FY2012.pdf

Effects of Global Warming

Water Quality

The impact of global warming on water temperature, water quality and their interaction is very complex.

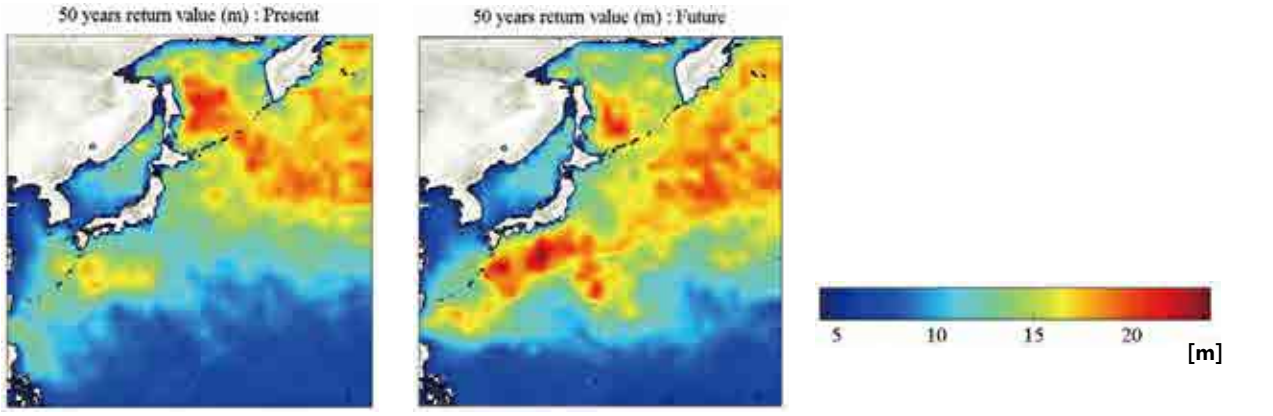
In rivers and lakes, water quality may deteriorate due to less water circulation and the increase in phytoplankton caused by rising water temperatures.



http://www.fao.org/fishery/static/FAO_Training/FAO_Training/General/x6709e/x6709e02.htm

Water Environment Under Global Warming in Japan

Wave Heights with Annual Exceedance Probabilities of 1in 50 in Japan's Surrounding Waters



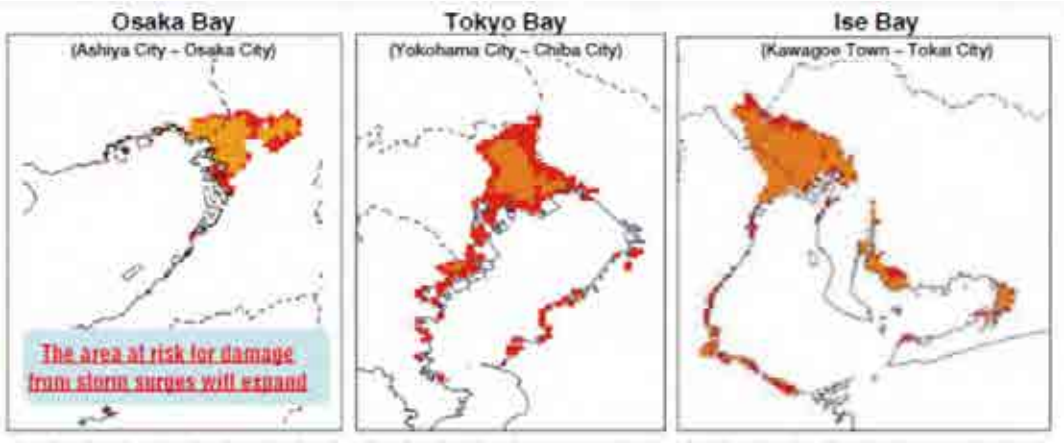
1979-2003(current)

2075-2099(future)

https://www.env.go.jp/en/earth/cc/impacts_FY2012.pdf

Projected heights of waves in Japan's surrounding waters with annual exceedance probabilities of 1 in 50 [m]. It is predicted that wave height will be high, mainly in western Japan.

Water Environment Under Global Warming in Japan



https://www.env.go.jp/en/earth/cc/impacts_FY2012.pdf

There is a large area of land at 0 m above sea level along Japan's three major bays (Tokyo Bay, Ise Bay and Osaka Bay), but assuming a sea level rise of 60 cm, the area of land at 0 m above sea level and the population in those zones would both increase by as much as 50%; therefore, future sea level rise has the potential to cause serious problems. Furthermore, changes in the course and intensity of typhoons could lead to an increased risk of high waves in coastal areas along the Pacific Ocean.

Water Environment Under Global Warming in Japan

The impacts of global warming on coral bleaching has been observed. In the future, these impacts are expected to continue expanding.

https://www.theverge.com/2018/1/4/16849336/global-warming-coral-reefs-bleaching-rate-climate-change

Countermeasures against Global Warming in Japan

<u>Balancing mitigation and adaptation strategies.</u>

IPCC（Intergovernmental Panel on Climate Change） states;

To adapt to unavoidable impacts that climate change will have on various fields over the long term, Japan will have to evaluate impacts and promote adaptation strategies in a well-planned manner.

Ex: We are promoting reducing energy consumption and shifting energy sources from fossil fuels to renewable energy.

Water Environment Under Global Warming in China

Global warming has frequently cause flooding in many coastal cities in China.

- **Jiangxi province**

https://baike.baidu.com/pic/

Water Environment Under Global Warming in China

The outbreaks of blue-green algae in one of the five largest Chinese lakes, Taihu, covering about a third of the lake surface, caused several million people in Wuxi city difficult to access fresh water for more than one week. The same problems also happened in other two Chinese Lakes, Chaohu and Dianchi.

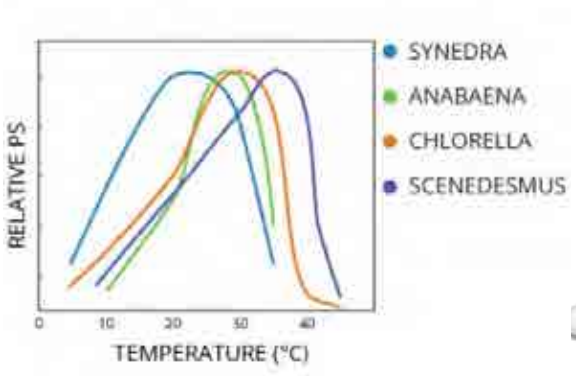
https://www.sigmaxi.org/docs/default-source/

Water Environment Under Global Warming in China

There are many factors influencing algae blooms, such as nutrient, light, temperature, wind driven mixing, water retention time, species competition and predation.

But rising temperatures as a result of global warming seemly have promoted the blooms in different ways.

Temperature affects the photosynthetic rates of different algae.



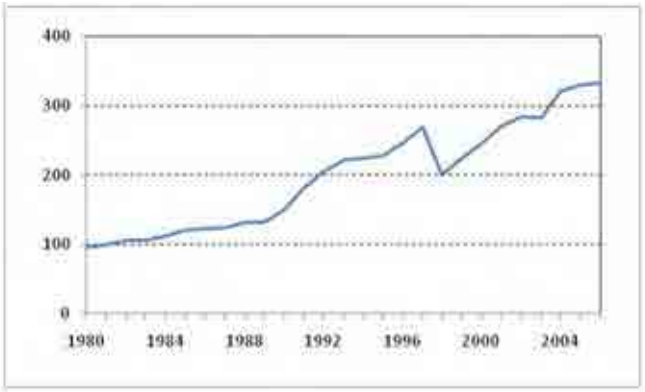
https://www.google.co.jp/search

Countermeasures against Global Warming in China

- Together with setting annual guiding limits for carbon dioxide emissions from energy use in 2016, carbon tax on fossil fuels started.
- China explored to expand nascent local carbon credit markets into a nationwide plan.

Water Environment under Global Warming in Indonesia

INDONESIA'S CO2 EMISSIONS (MILLIONS OF METRIC TONS) FROM 1980-2006

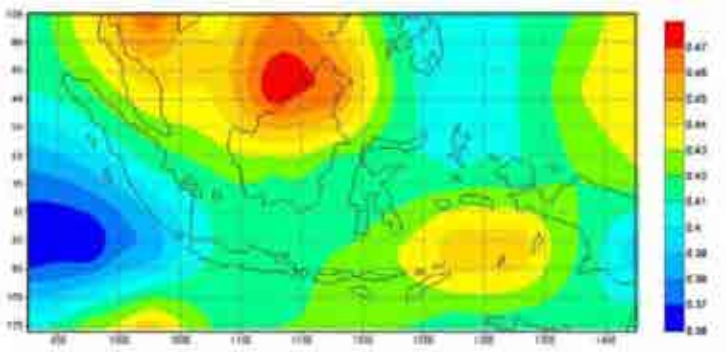


- The increase in greenhouse gas emissions will also continue to affect the "natural" climate variability, thus leading to more intense weather events.
- In Indonesia dramatic weather are taking place because of global warming.
- Extreme weather is predicted to increase in about 2 percent to 3 percent more rainfall in Indonesia each year.

Measey, 2010. Indonesia: A Vulnerable Country in the Face of Climate Change Global Majority E-Journal, Vol. 1, No. 1 (June 2010), pp. 31-45

Water Environment under Global Warming in Indonesia

PROJECTED CHANGE OF MEAN TEMPERATURE INDONESIA IN 2020

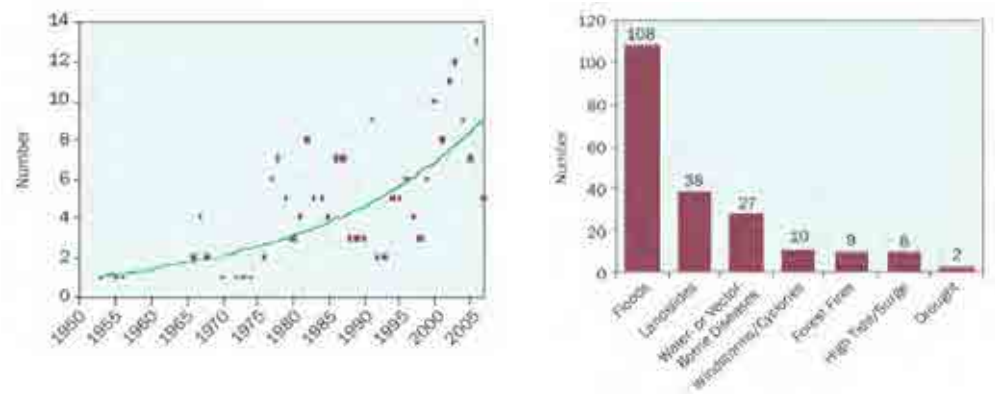


- As a result of extreme weather, Indonesia will experience a modest temperature increase.
- Since 1990, the annual mean temperature in Indonesia has increased around 0.3 degrees Celsius, and has occurred during all of the yearly seasons.
- In the year 2020, it is expected that the mean temperature in Indonesia will have increased by 0.36 to 0.47 degrees Celsius, with the highest temperatures increase projected to occur in the Kalimantan islands.

Measey, 2010. Indonesia: A Vulnerable Country in the Face of Climate Change Global Majority E-Journal, Vol. 1, No. 1 (June 2010), pp. 31-45

Water Environment Under Global Warming in Indonesia

Number Hazard Occurrences in Indonesia 1950-2005



Measey, 2010. Indonesia: A Vulnerable Country in the Face of Climate Change Global Majority E-Journal, Vol. 1, No. 1 (June 2010), pp. 31-45

Global warming will increase the rise in the sea-level, which will increase floods and simultaneously affect those people who are dependent on agriculture and fisheries.

Global warming and the induced sea-level rise are going to drastically effect the agricultural sector in Indonesia

- **Flood in Jakarta**

A flooded roundabout in Jakarta paralyzing traffic on 9 February 2015 after heavy overnight rains.

- **Java Landslide**

- Floods in Jakarta occurred, caused by high intensity of rainfall under global warming and also poor drainage system in Jakarta.
- Landslides can be triggered by rainfall, changes in water level, and stream erosion.

Countermeasures against Global Warming IN Indonesia

- Technical flood measures are undertaken for better drainage and to prevent floods
- LULUFC (land use, land use change, and forestry) policy by the government Indonesia to protect the forest from forest crime and forest fire.
- Jakarta has also invested in adaptation to extreme weather, such as raising awareness, law enforcement, and early warning and emergency systems
- Jakarta is currently working on a flood management plan which includes the development of flood hazard maps and the development of shelters and FEWS (flood early warning systems)

Conclusions

- Water environment is an important things for human society to live and develop, and it is also the most serious area that is disturbed and destroyed by human beings.
- Global warming is primarily a problem of too much carbon dioxide (CO_2) in the atmosphere—which acts as a blanket, trapping heat and warming the planet.
- Global warming affected water environment.

Discussion Topics

- Do you think there are positive impacts of global warming to the water environment？ Whats？
- How we can encounter global warming ？

Which Natural Energy Sources Have the Realistic Potential for the Future?

Content:

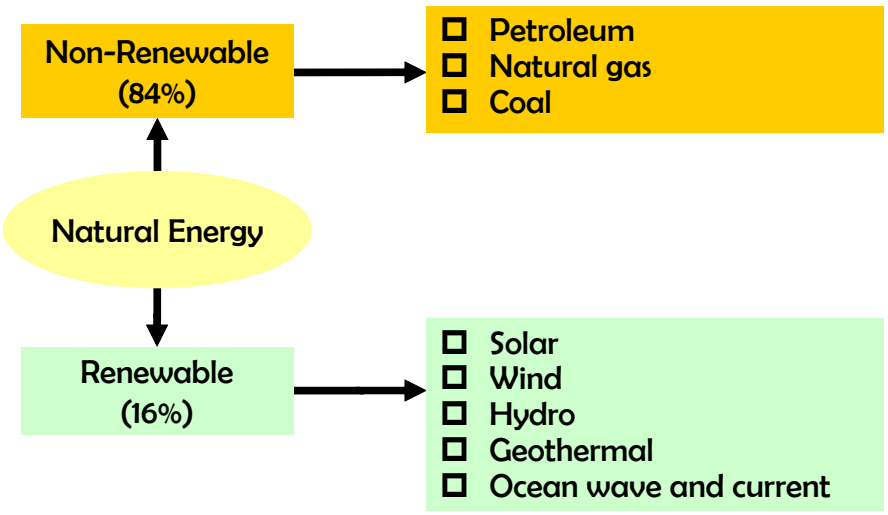
1. Natural Energy Sources
2. Key Drivers of the Renewable Energy for the Future
3. Renewable Energy for the Future
4. Which Energy Sources Have the Realistic Potential in China, Indonesia and Japan
5. Conclusion
6. Discussion

Chen Fang	D2
Akito Kato	M2
Maulana Yusuf Rosadi	M2

Natural Energy Sources

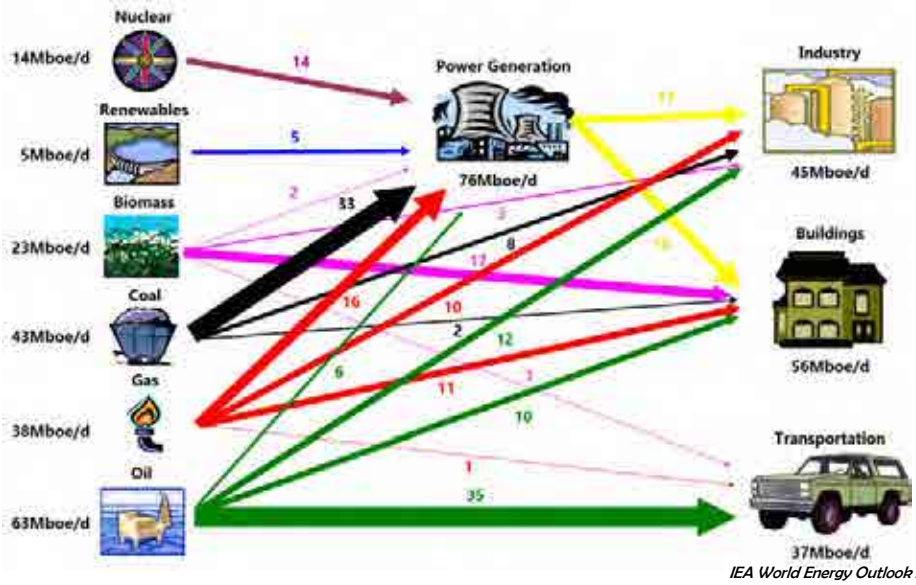
1. Energy Sources

- Natural energy is energy generated from natural resources and manifest itself in many different forms, such as heat, light, sound, magnetism, gravity, movement, and all life function.
- Non-renewable energy is energy from sources that will replenish in our lifetimes.
- Renewable energy is energy from sources that will not deplete when used.



Natural Energy Sources

2. Energy Uses

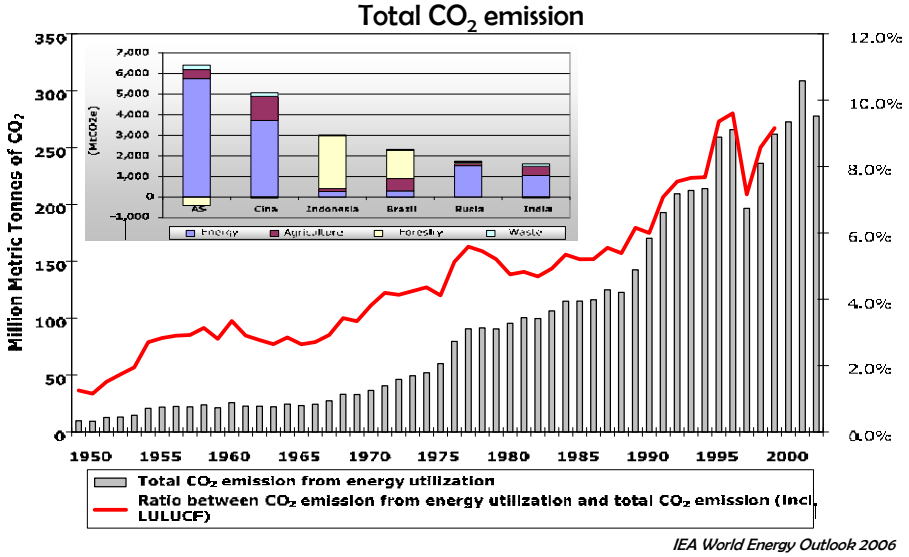


IEA World Energy Outlook 2006

- Energy uses for industry: electricity, heating and cooling, manufacturing, distribution, construction and conditioning, etc.
- Energy uses for building: electricity, water distribution, etc.
- Transportation.

Natural Energy Sources

3. Why Do We Need Renewable Energy?



IEA World Energy Outlook 2006

- Reserve-to-production ratio of fossil fuel (Oil : 40 years , Natural gas : 67 years , Coal : 192 years).
- Energy consumption causing environmental problems such as global warming and waste disposal problem.

- Most of CO_2 that causes global warming is generated by combustion of fossil fuels.
- Renewable energy does not need combustion to generate the power.

Renewable energy produce less CO_2 emissions

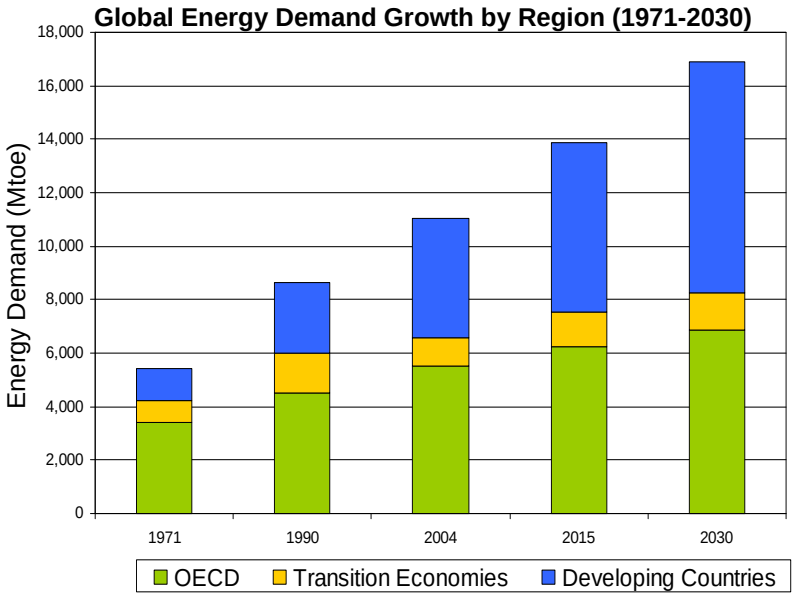
Key Drivers of the Renewable Energy for the Future

1. Energy demand growth
   - A population, economic growth, and energy efficiency improvements are the key influences on energy demand.
2. Security and energy supply challenges
   - The geographical distribution of various sources of energy.
   - Policymaking of the energy producing states.
   - Technologies development.
   - The price of various sources of energy.
3. Environmental impacts
   - Low-emission natural gas generation.
   - Zero-emission renewable energy.
   - Advanced grid technologies and energy storage.
4. Technology and policy

Key Drivers of the Renewable Energy for the Future

1. Energy Demand

Global energy demand is projected to increase by just over one-half between now and 2030 – an average annual rate of 1.6%. Over 70% of this increased demand comes from developing countries.

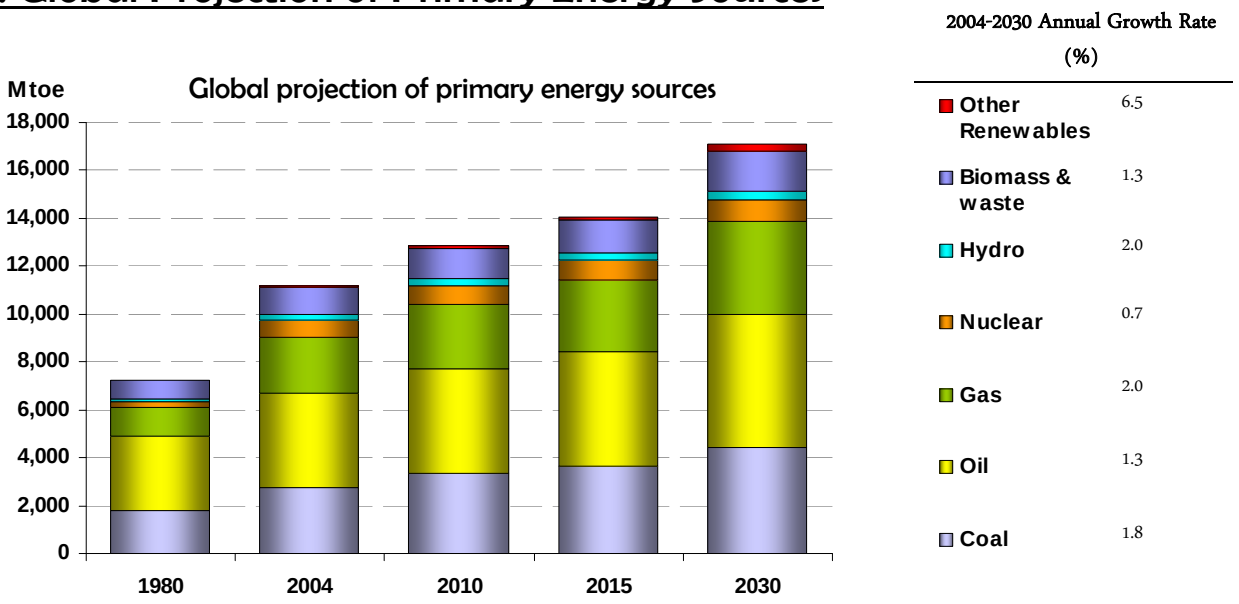


Notes: 1. OECD refers to North America, West Europe, Japan, Korea, Australia and New Zealand
2. Transition Economies refers to Russian Federation and Eastern European nations
3. Developing Countries is all other nations including China, India etc.

IEA World Energy Outlook 2006

Key Drivers of the Renewable Energy for the Future

2. Global Projection of Primary Energy Sources



Note: 'Other renewables' include geothermal, solar, wind, tide and wave energy for electricity generation

IEA World Energy Outlook 2006

- The non-renewable energy still will be the primary energy sources in 2030.
- The growth rate of renewable energy will increase about 6.5% in 2030.

Key Drivers of the Renewable Energy for the Future

3. Energy Related Technology

Primary Energy Sources:

- Light Crude
- Heavy Oil
- Tar Sands
- Wet gas
- Tight gas
- Nuclear
- Coal
- Solar
- Wind
- Biomass
- Hydro
- Geothermal

Extraction & Conversion Technologies:

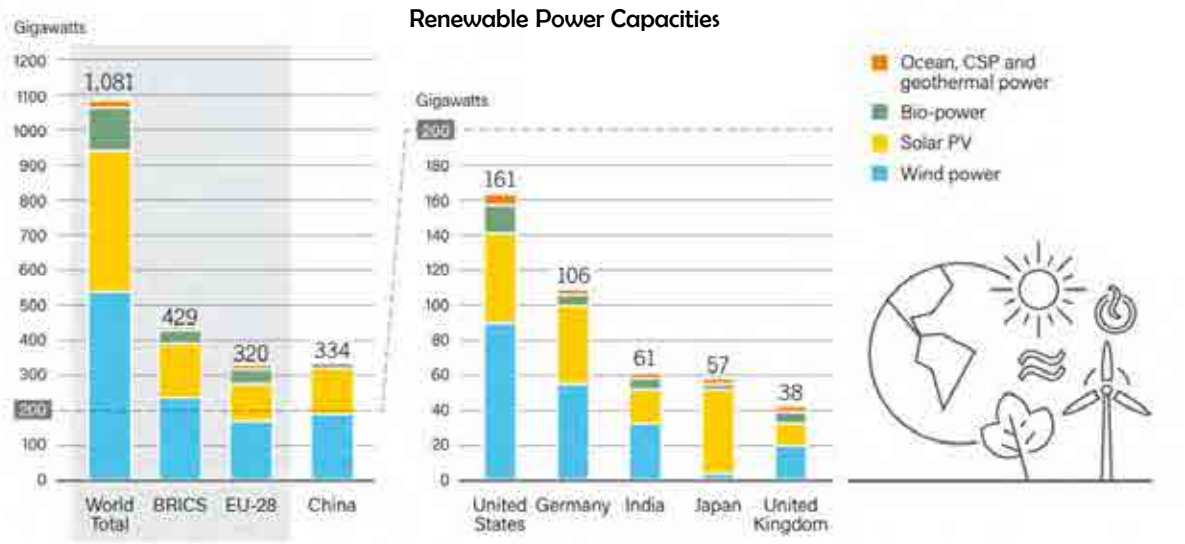
- Exploration
- Liquefied natural gas (LNG)
- Refining
- Differentiated fuels
- Advantaged chemicals
- Gasification
- Syngas conversion
- Power generation
- Photovoltaics
- Bio-enzyimatics
- H_2 production & distribution
- CO_2 capture & storage

End Use Technologies:

- Advanced Batteries
- Hybridisation
- Fuel cells
- Hydrogen storage
- Gas turbines
- Building efficiency
- Urban infrastructure
- Systems design
- Retail technologies

Renewable Energy for the Future

Renewable Power Capacities in World

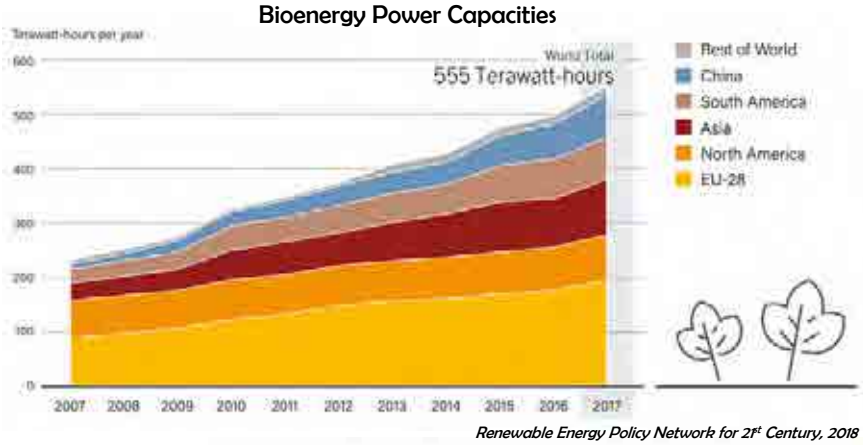


- Wind is the largest renewable energy source in world followed by solar power.
- China is the largest wind power and solar power producer.

Renewable Energy for the Future: Bioenergy

What is it?

- Biomass is a renewable energy source made of biological material from living, or recently living organisms.
- Energy is released by combustion (burning).

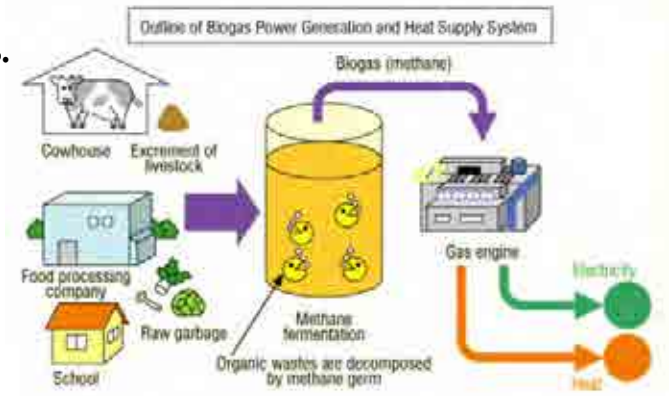


Advantages

- Produces less pollution than fossil fuels.
- Does not cause acid rain.
- Can be found locally.
- It is renewable.

Disadvantages

- Inefficient (only 30% efficiency).
- Releases harmful solid carbon particles into the atmosphere.

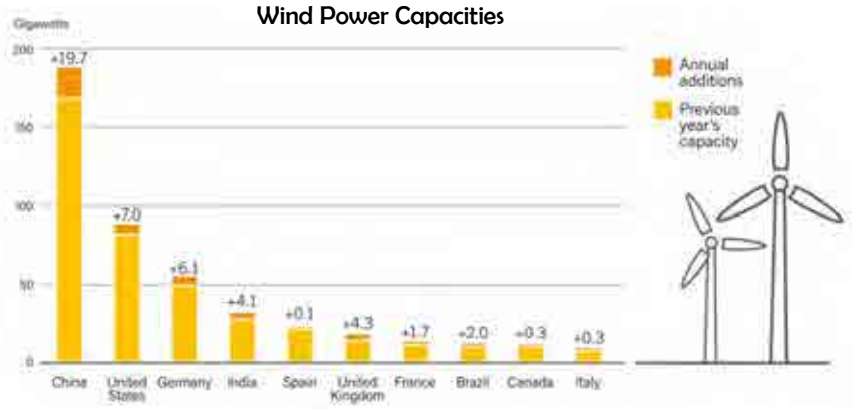


http://2014.igem.org/Team:UGA-Georgia/%E2%80%9Chttp://2014.igem.org/Team:UGA-Georgia/Overview%22

Renewable Energy for the Future: Wind Power

What is it?

- Wind turbines are used to generate electricity from the wind.
- The wind turns the large blades and the blades turn a generator.



Renewable Energy Policy Network for 21st Century, 2018

Advantages

- Wind is renewable.
- Wind is free.
- No greenhouse gases are made.
- There are few safety risks.

https://www.japanindustrynews.com/2016/09/japan-eyes-wind-farms-power-energy-needs-sets-ambitious-goals/

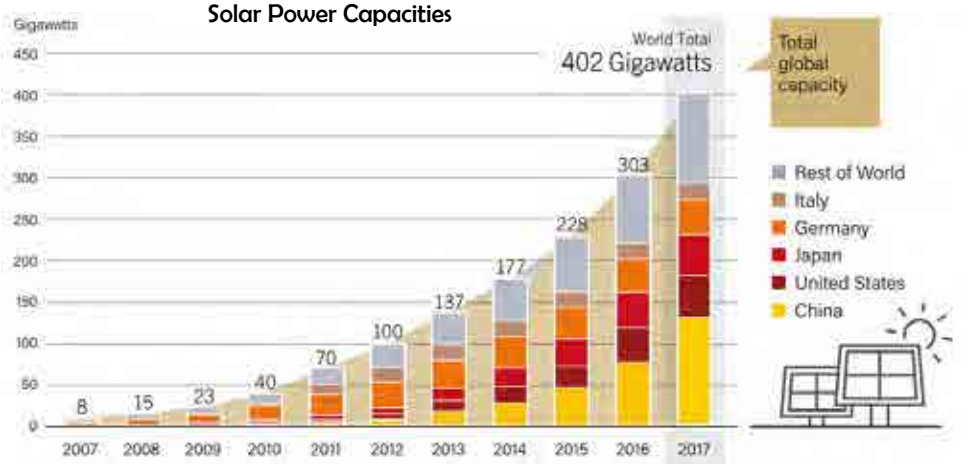
Disadvantages

- Lots of wind turbines are needed to produce enough energy.
- Turbines can only be put in windy areas.
- It is not always windy.

Renewable Energy for the Future: Solar Power

What is it?

- Solar power uses energy from the sun.
- Solar panels transfer the sun's energy to power generation.



Renewable Energy Policy Network for 21st Century, 2018

Advantages

- The energy from the sun is free.
- The sun does not produce greenhouse gases.
- The sun will always be there during our lifetime.

http://news.mit.edu/2016/mit-neutralize-17-percent-carbon-emissions-through-purchase-solar-energy-1019

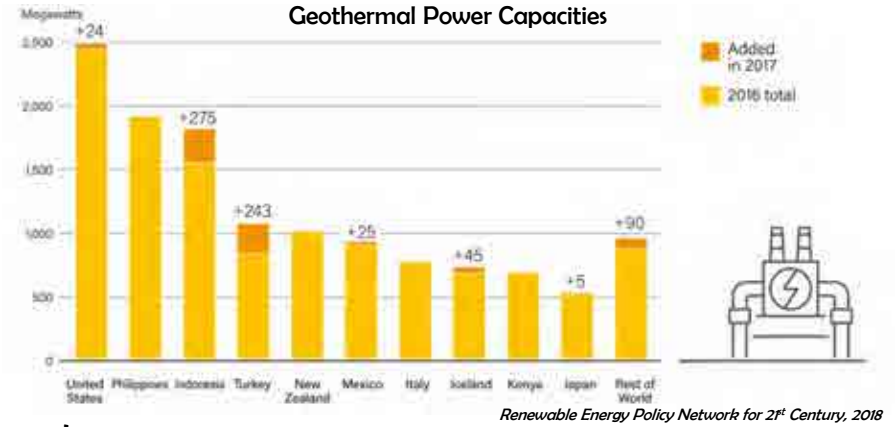
Disadvantages

- Solar panels are expensive.
- When it is cloudy or at night there is not enough light to produce energy.
- It needs wide area.

Renewable Energy for the Future: Geothermal Power

What is it?

- Rocks under the ground are hot.
- Water can be pumped through these hot rocks and warmed up.



Renewable Energy Policy Network for 21st Century, 2018

Advantages

- Geothermal energy does not produce greenhouse gases.
- The energy source is free and will not run out.

Disadvantages

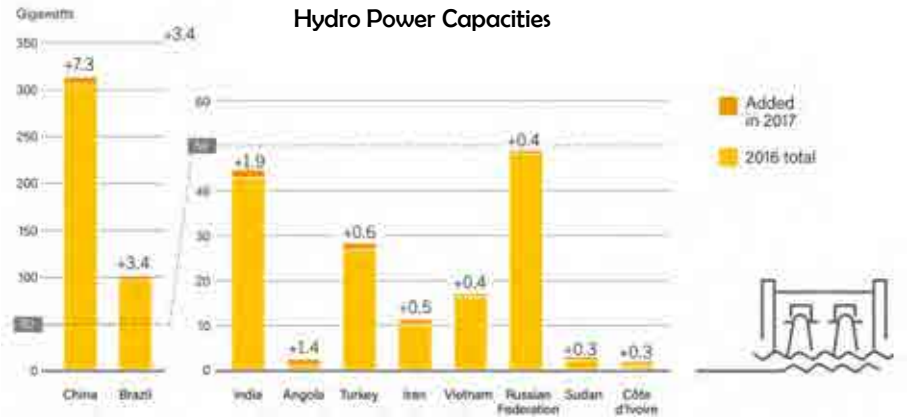
- There are not many places where we can build geothermal power stations.
- Harmful gases and minerals may occasionally come up from the ground below. These can be difficult to control.

https://financialtribune.com/articles/energy/51404/irans-geothermal-power-plant-launch-slated-for-2017

Renewable Energy for the Future: Hydro Power

What is it?

- Flowing water is used to turn a turbine which generates electricity.



Renewable Energy Policy Network for 21st Century, 2018

Advantages

- When the electricity is generated, no greenhouse gases are made.
- The water used is free.
- It is a renewable energy source.

Disadvantages

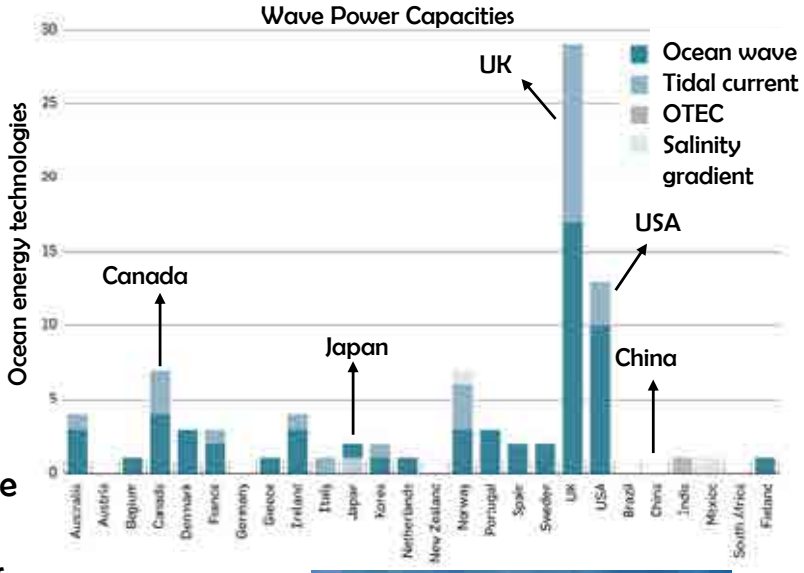
- The dam is expensive to build.
- By building a dam, the nearby area has to be flooded and this could affect nearby habitats.
- If it does not rain much we may not have enough water to turn the turbines.

http://www.worldwatch.org/hydropower-and-geothermal-growth-slows-0

Renewable Energy for the Future: Wave Power

What is it?

- Waves force air in and out of a chamber.
- The air causes a turbine to generate electricity.



Advantages

- Waves are free and it is renewable energy.
- Wave power does not produce greenhouse gases.
- There are very few safety risks.

Disadvantages

- Small waves generate small amounts of electricity.
- Electricity needs to be transported from the sea onto the land.
- The equipment is expensive

https://www.powerengineeringint.com/articles/2013/08/israeli-wave-energy-set-for-guinea.html

Which Energy Sources Have the Realistic Potential in CHINA

1. Why Do We Need to Use the Renewable Energy?

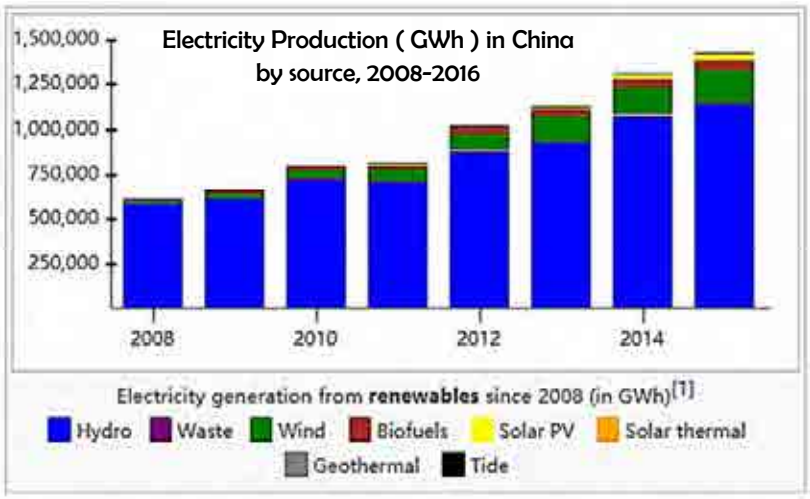
Year	Total generation	Fossil			Nuclear	Total renewables	% Non-renewables
		Coal	Oil	Gas			
2008	3,481,985	2,743,767	23,791	31,028	68,394	615,005	82.34
2009	3,741,961	2,940,750	16,612	50,813	70,134	663,651	82.26
2010	4,207,993	3,250,409	13,236	69,027	73,880	801,441	80.95
2011	4,715,761	3,723,315	7,786	84,022	86,350	814,288	82.73
2012	4,994,038	3,785,022	6,698	85,686	97,394	1,019,238	79.59
2013	5,447,231	4,110,826	6,504	90,602	111,613	1,127,686	79.30
2014	5,678,945	4,115,215	9,517	114,505	132,538	1,307,170	76.98
2015	5,869,958	4,108,994	9,619	145,346	170,789	1,425,180	75.72
2016	6,217,907	4,241,786	10,367	170,488	213,287	1,581,979	74.56

Electricity production (GWh) in China by source, 2008-2016

- Climate change is one of the greatest environmental challenges that we have ever faced, and the main cause behind it is our dependence on fossil fuels.
- The increasing population in China need more energy sources. There is not a limitless amount available, therefore, non-renewables won't be enough in the future.

Which Energy Sources Have the Realistic Potential in CHINA

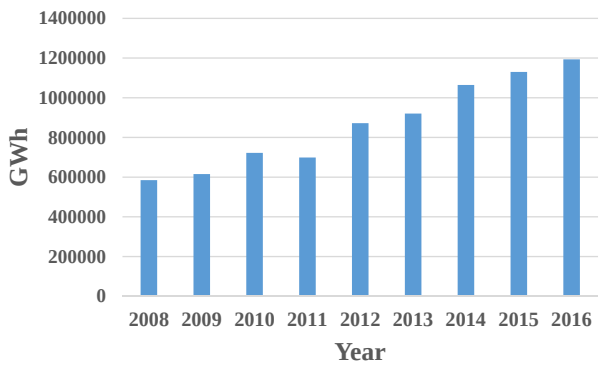
2. Renewable Energy Production in China



- In the end of 2016 hydro power become the largest energy source of renewable electricity production at 1,193 TWh.
- Wind power provided the next largest share with 237 TWh followed by Solar PV at 75 TWh.
- Solar PV power started from a low base of just 152 GWh in 2008 and has grown rapidly since then to reach over 75 TWh by 2016.
- The ratio of renewable energy increases every year.

Which Energy Sources Have the Realistic Potential in CHINA

3. Hydro Power in China



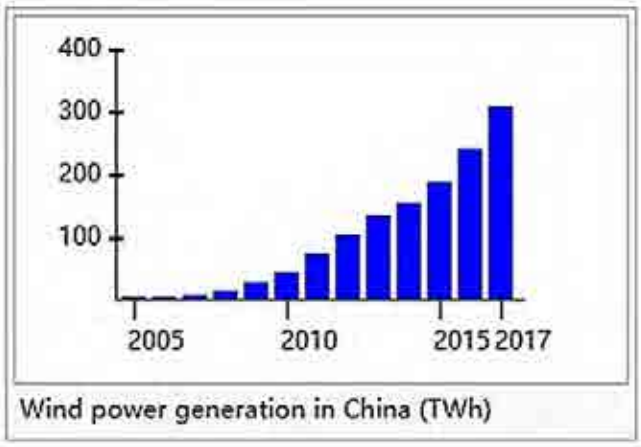
1. Hydro power is currently China's largest renewable energy source and the second overall after coal.
2. The first hydro power plant in China was built in Yunnan province in 1912, with a capacity of 240 kW.
3. The Three Gorges Dam is the largest power station (of any kind) in the world by installed capacity, with 22.5 GW.

https://en.wikipedia.org/wiki/Hydroelectricity_in_China

Which Energy Sources Have the Realistic Potential in CHINA

4. Wind Power in China

Shan Xi Province



Wind power generation in China (TWh)

Shang Hai City

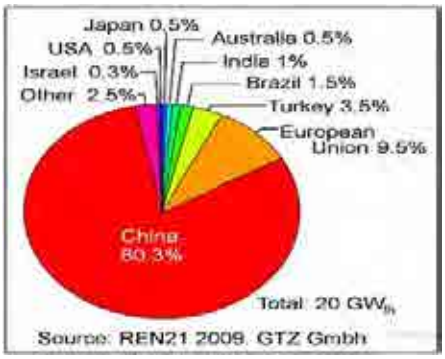
Wind power has been developed greatly in just 15 years.

https://en.wikipedia.org/wiki/Wind_power_in_China

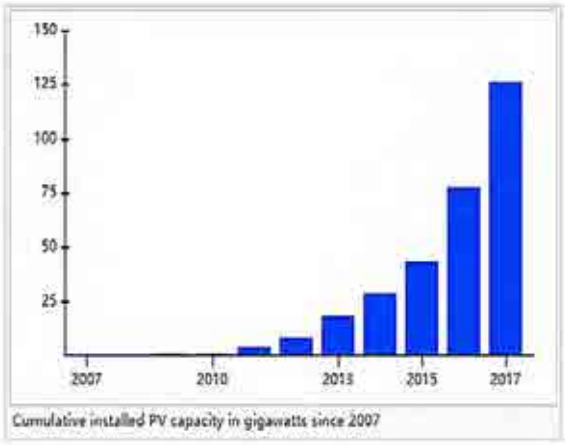
Which Energy Sources Have the Realistic Potential in CHINA

5. Solar Power in China

Rooftop solar water heaters are ubiquitous in China



Worldwide new solar hot water installations during 2007,



Cumulative installed PV capacity in gigawatts since 2007

The first solar power was used in China in Henan Province from 1975. Solar power has been developed a lot in recent 10 years. China is the world's largest market for both photovoltaics and solar thermal energy.

https://en.wikipedia.org/wiki/Wind_power_in_China

Which Energy Sources Have the Realistic Potential in CHINA

6. Geothermal Power in China

Yangbajain Geothermal Field

1. Geothermal exploration began in China in the 1970s
2. The most famous field is **Yangbajain Geothermal Field.** The field extension is only 4 km^2. The annual energy production is approximately 100 GWh, about 30% of the needs of the Tibetan capital, Lhasa.
3. Until 2006, 181 geothermal systems had been found on mainland China, with an estimated generation potential of 1,740 MW. However, only seven plants, with a total capacity of 32 MW, had been constructed and were operating in 2006.

https://en.wikipedia.org/wiki/Wind_power_in_China

Which Energy Sources Have the Realistic Potential in CHINA

7. National Policies

- The Chinese government is implementing multiple policies to promote renewable energy:

  (1) From 2008 to January 2012, China held the top spot in clean energy investment;

  (2) The Renewable Energy Law passed in 2005 explicitly states in its first chapter that the development and the usage of renewable energy is a prioritized area in energy development and many other policies.

8. The 13th Renewable Energy Development Five Year Plan (2016-2020)

- Increase installed renewable power capacity to 680 GW by 2020.
- Increase installed wind capacity to 210 GW.
- Promote offshore wind and ocean power development.
- Lead renewable energy technology innovation.
- Further support development of the renewable energy industry in China and decrease reliance on foreign companies in the domain.

Which Energy Sources Have the Realistic Potential in CHINA

9. Potential for the Future

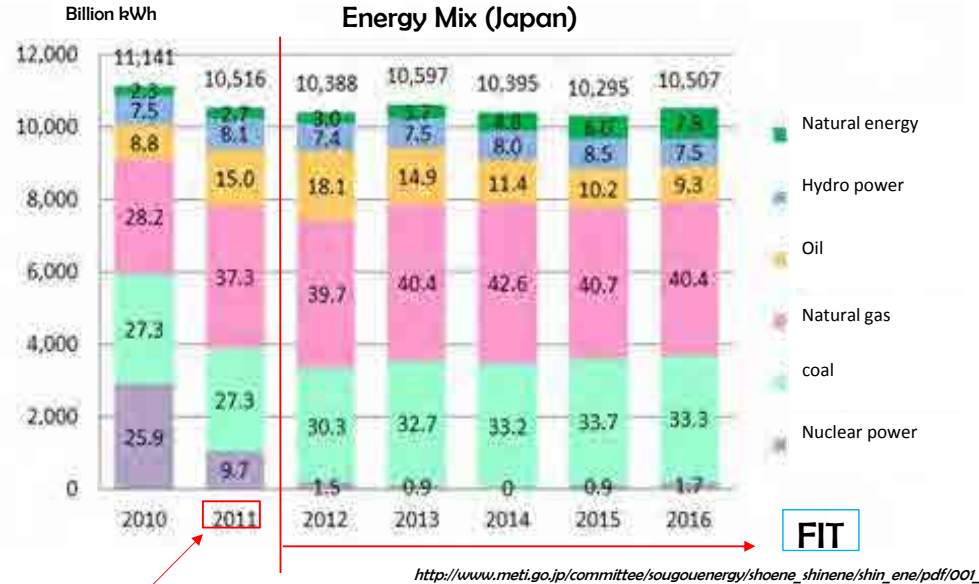
- Geothermal power
  - Geothermal sources in China are abundant and widely distributed throughout the country.
- Hydro power
  - Big rivers, especially Yangtze River and HuangHe River, with big discharge are abundant.
- Wind power
  - China has the largest wind sources in the world and three-quarters of this natural source is located at sea.

Year	Total generation	Renewable								Total renewables	% renewables
		Waste	Hydro	Wind	Biofuels	Solar PV	Solar thermal	Geothermal	Tide		
2008	3,481,985	0	585,187	14,800	14,715	152	0	144	7	615,005	17.66%
2009	3,741,961	0	615,640	26,900	20,700	279	0	125	7	663,651	17.74%
2010	4,207,993	9,064	722,172	44,622	24,750	699	2	125	7	801,441	19.05%
2011	4,715,761	10,770	698,945	70,331	31,500	2,604	6	125	7	814,288	17.27%
2012	4,994,038	10,968	872,107	95,978	33,700	6,344	9	125	7	1,019,238	20.41%
2013	5,447,231	12,304	920,291	141,197	38,300	15,451	26	109	8	1,127,686	20.70%
2014	5,678,945	12,956	1,064,337	156,078	44,437	29,195	34	125	8	1,307,170	23.02%
2015	5,859,958	11,029	1,130,270	185,766	52,700	45,225	27	125	8	1,425,180	24.32%
2016	6,217,907	11,413	1,193,374	237,071	64,700	75,256	29	125	11	1,581,979	25.44%

Electricity production (GWh) in China by source, 2008-2016

Which Energy Sources Have the Realistic Potential in JAPAN

1. Current Situation



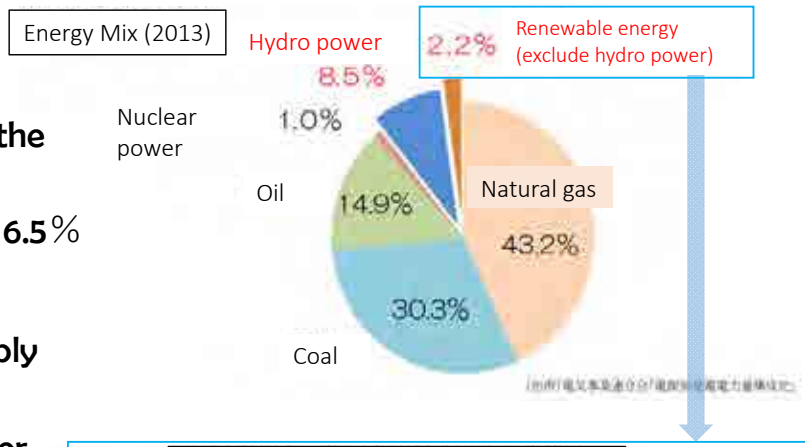
http://www.meti.go.jp/committee/sougouenergy/shoene_shinene/shin_ene/pdf/001_03_00.pdf

The Great East Japan Earthquake
The accident in Fukushima *Daichi* Nuclear Power Plant

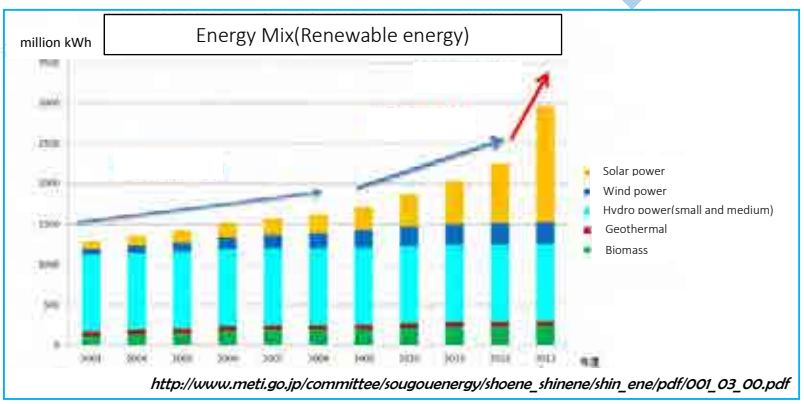
⇨ After that, renewable energy is committed

Which Energy Sources Have the Realistic Potential in JAPAN

- Japan is depending on the import of fossil fuels.
- Energy self-sufficiency : 6.5％



- Renewable energy supply is increasing.
- In particular, solar power generation is increasing.



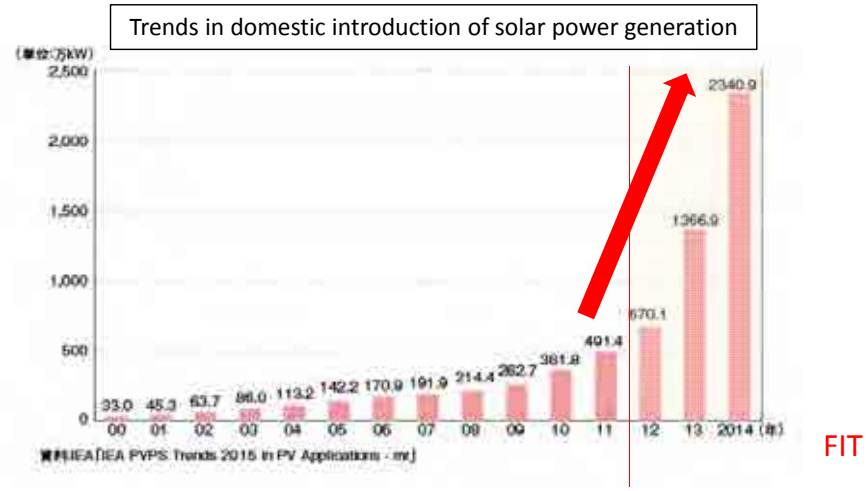
http://www.meti.go.jp/committee/sougouenergy/shoene_shinene/shin_ene/pdf/001_03_00.pdf

Current renewable energy:

- Solar power generation
- Hydro power generation

Which Energy Sources Have the Realistic Potential in JAPAN

2. Solar Power Generation



FIT

Solar power generation has spread rapidly

Feed-In Tariff (FIT)

- Introduced in 2012.
- A system to disseminate renewable energy in large quantities.
- Requires electricity companies to purchase renewable energy at a certain price [Power selling price(Solar power) : 30 yen/kWh , electricity charges : 20 yen/kWh].
- After introducing the system, solar power generation has spread rapidly.

Which Energy Sources Have the Realistic Potential in JAPAN

3. Hydro power Generation

In Japan, there are many steep mountainous areas, river flow rate is high because there are many precipitation (potential of power generation is high).

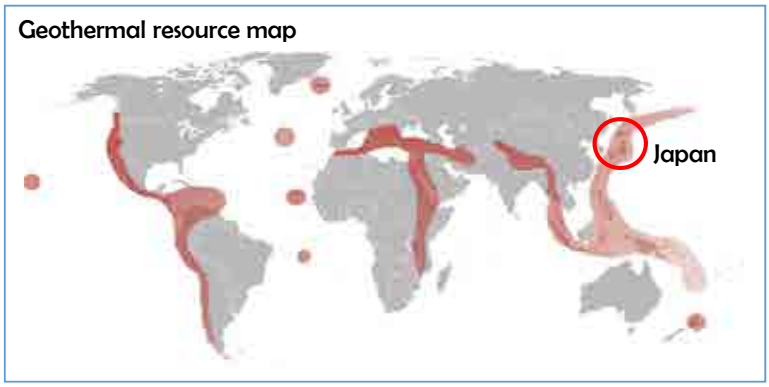
https://toyokeizai.net/mwimgs/1/4/1140/img_14ed38bc35a88be72b92ba32c96fe2b4336510.jpg

- ☐ Large hydro power (dam)
  - Large hydro power plants with dam has been constructed.
  - Problems: environmental destruction, getting local agreement is difficult.
- ☐ Micro hydro power
  - Small burden to the natural environment.
  - Low cost (compared with large hydropower).
  - To adjust water rights (the right to use river water) is difficult, because in Japan water use is not free.

https://www.bing.com/images/search?q=%e3%83%9e%e3%82%a4%e3%82%af%e3%83%ad%e6%b0%b4%e5%8a%9b%e7%99%ba%e9%9b%bb&FORM=HDRSC2

Which Energy Sources Have the Realistic Potential in JAPAN

4. Geothermal Power



https://www.bing.com/images/search?view=detailV2&ccid=7vBmIg7E&id=72A18D4D2BBIFB3A8146C9E0DD4066CA1780B6D8&thid=OIP.7vBmIg7ErTQzmhLJZXc_5wHaE_&mediaurl=http%3a%2f%2fwww.enecho.meti.go.jp%2fcategory%2fsaving_and_n

Ranking (Geothermal resources)

1	The U.S
2	Indonesia
3	Japan
4	Philippines
5	Mexico
6	Iceland
7	New zealand
8	Italy

- ☐ Japan is the 3rd largest geothermal resource in the world.
- ☐ The potential geothermal power generation is high in Japan.

but

- ☐ Japan is the world's 10th largest geothermal electricity producer.
- ☐ Geothermal power generation is not progressing very much.

Which Energy Sources Have the Realistic Potential in JAPAN

5. Potential for the Future

- Solar power generation
  - Renewable energy that is easy to develop.
  - It may be unsuitable in Japan where the land areas is small and climate change is intense.

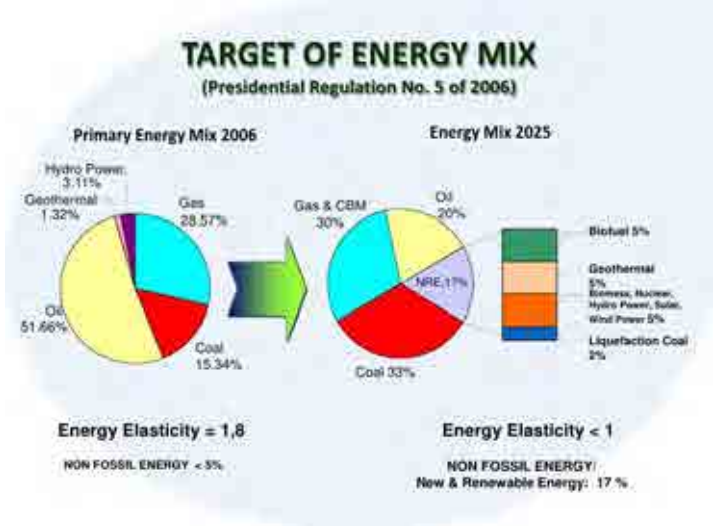
- Hydro power generation
  - Potential of power generation is high.
  - Large hydro power plants with dam were already constructed.
  - There are some problems, development potential is high for micro hydro power.

- Geothermal power generation
  - In Japan, one of the world leading volcanic countries, geothermal resources are abundant.
  - Geothermal power generation is not progressing very much.
  - Local hot spring right, development restriction in national parks.
  - The potential geothermal power generation is high.

Which Energy Sources Have the Realistic Potential in INDONESIA

- New Energy: Liquefied coal, coal bed methane, gasified gas, nuclear, hydrogen, other methane.

Indonesian Institute for Energy Economics Foundation, 2007



National Energy Policy, 2006

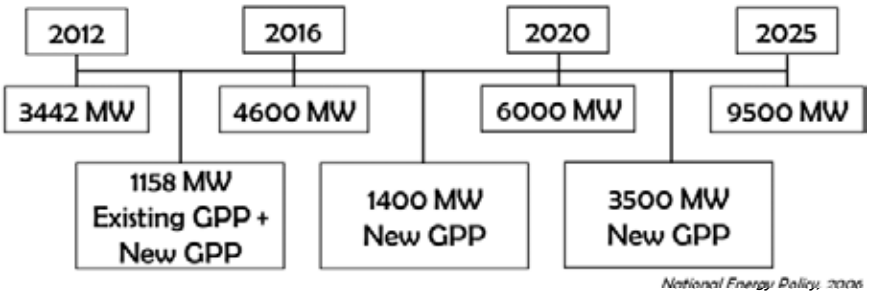
- Renewable Energy: geothermal, hydro, bioenergy, solar, ocean wave and current.

Which Energy Sources Have the Realistic Potential in INDONESIA

1. Geothermal Power Development

- Geothermal plant installed capacity: 5,711 MW (2017).
- Indonesia is the world's third largest geothermal electricity producer.

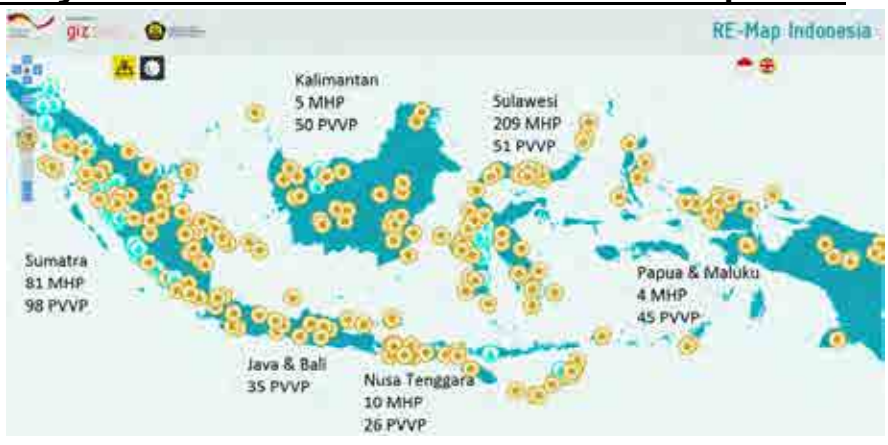
U.S. Energy Information Administration, 2015



National Energy Policy, 2006

Which Energy Sources Have the Realistic Potential in INDONESIA

2. Hydro Power and Solar Power Development



Thomas Beauchamp, Solar PV microgrid costs in Indonesia, 2016

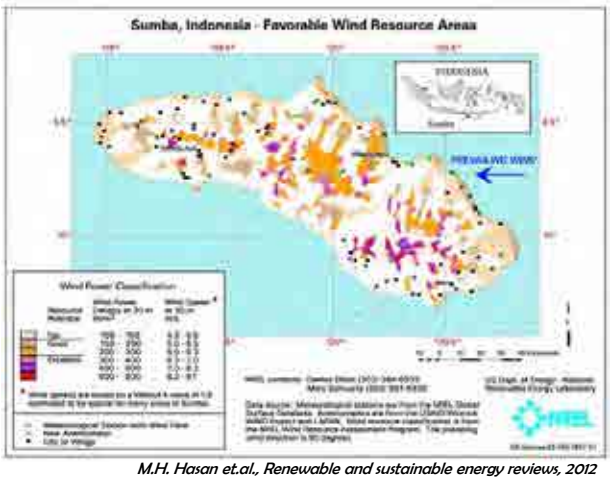
https://emerhub.com/indonesia/investing-hydro-solar-power-indonesia/, 2016

http://www.vale.com/indonesia/en/business/energy/our-hydro-power-plant-in-indonesia/karebbe-hydroelectric-plant/pages/default.aspx

- Current Condition
  - Hydro power plant installed capacity: 5258 MW.
  - Solar power plant installed capacity: 27.23 MW.
- Development program
  - Feed-in tariff.
  - Enhancing the capability of domestic manufacturer.
  - Improving capacity building.

Which Energy Sources Have the Realistic Potential in INDONESIA

4. Wind Power Development



M.H. Hasan et.al., Renewable and sustainable energy reviews, 2012

Current Condition

- Wind power plant Installed capacity: 1.4 MW.
- Potential areas are in South Sulawesi and Lesser Sunda Islands.

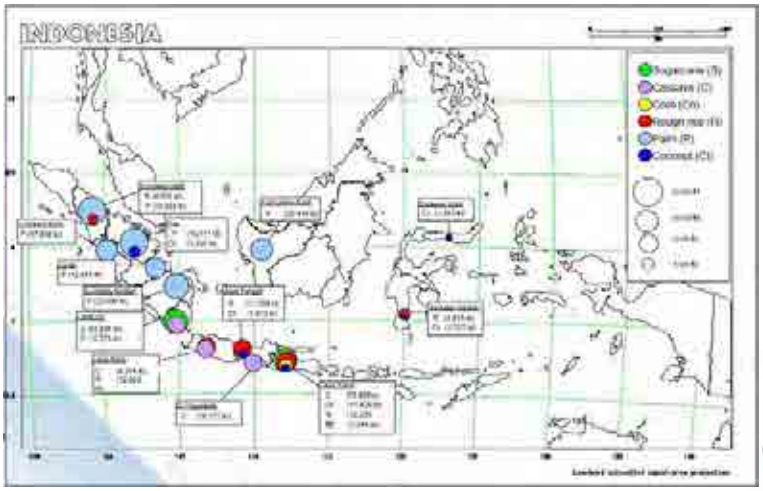
http://en.sumbaiconicisland.org/the-story-of-renewable-energy-in-sumba/

Development program

- Conducting feasibility study.
- Increasing foreign partnership.
- Encouraging domestic industrial competitiveness.
- Feed-in tariff.

Which Energy Sources Have the Realistic Potential in INDONESIA

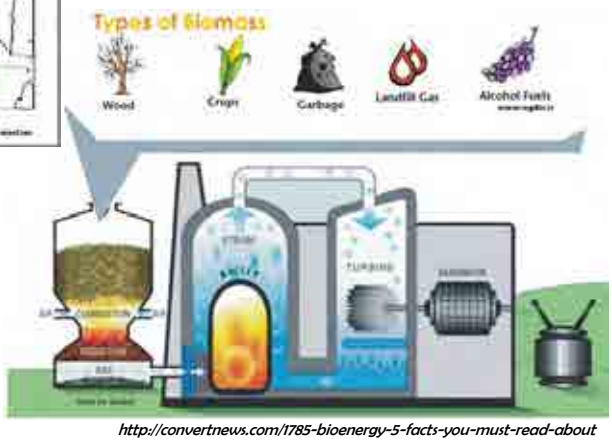
3. Bioenergy Power Development



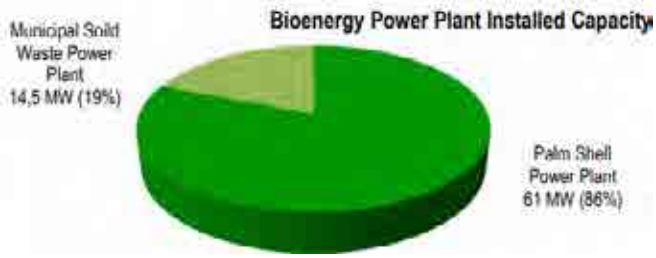
global.mongabay.com, Indonesia increases biofuel target to 10 percent by 2010, 2008

Current Condition

- On-grid installed capacity: 71 MW.
- Off-grid installed capacity: 612 MW.



http://convertnews.com/1785-bioenergy-5-facts-you-must-read-about



global.mongabay.com, Indonesia increases biofuel target to 10 percent by 2010, 2008

Which Energy Sources Have the Realistic Potential in INDONESIA

5. Potential for the Future

- Geothermal power
  - Indonesia is the world's third largest geothermal power producer.
  - Indonesia is the biggest volcanic islands.
- Bioenergy
  - More than 50% of Indonesia is covered by forest.
  - Recycled waste from agriculture and food industry are abundant.
- Hydro power
  - Big rivers with high debits are abundant.
  - High annual rain intensity is enough to generate power from the river.
- Solar power
  - Tropical season in Indonesia is beneficial to generate power from the sun.
  - East Indonesia is the best area to establish solar power plant.

http://celebesnews.id/2017/10/06/dpr-kaji-panas-bumi-sebagai-sumber-energi-terbarukan/

http://www.vale.com/indonesia/en/business/energy/our-hydro-power-plant-in-indonesia/karebbe-hydroelectric-plant/pages/default.aspx

Conclusion

- Natural energy is energy that comes from nature and can be divided into non-renewable energy and renewable energy.
- Non-renewable energy will run out in our lifetimes, such as oil, coal, etc.
- Renewable energy is not depleted when used, such as solar, wind, etc.
- Renewable energy can be used for power generation, heating, transportation.
- Renewable sources such as wind power, solar power, and hydroelectricity have the advantage of being able to conserve water, lower pollution and reduce CO_2 emissions.
- Wind and solar are realistic energy sources in the future.

Discussion

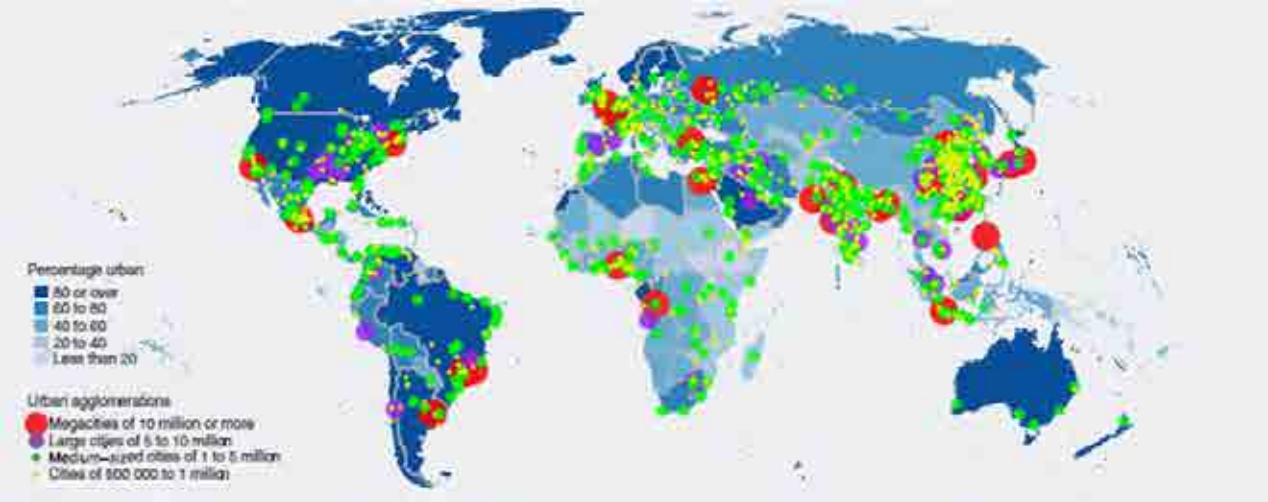
1. What kind of renewable energy now is mostly used in your country and why?
2. Do you think which natural energy has realistic potential in the future? And why?

Development and environmental assessment in coastal areas

D2 Masaya Toyoda
D1 Ruoming Cao
M2 Yuta Nakano

Contents

Worldwide urban distribution with population over 500,000

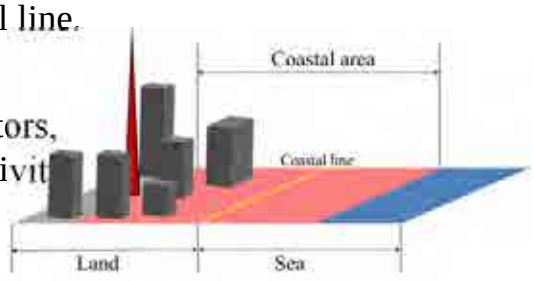


https://honkawa2.sakura.ne.jp/1168.html

- ✓ 70% of the earth is covered with sea.
- ✓ Most of mega cities in the world are located concentratedly in the coastal area.

Definition of coastal area

- ✓ The coastal areas is a belt area which is sandwiched by marine side and land side divided by coastal line.
- ✓ The coastal areas varies greatly depending on coastal geological, ecological and physical factors, coastal ocean strength and scope by human activit development level, social system, etc.



Various land side ranges of coastal area in the world

Countries	Land side range (m)	Countries	Land side range (m)	Countries	Land side range (m)
Japan	50	Spain	500	Venezuela	50
Cyprus	50	Costa Rica	200	France	100
Togo	100	Indonesia	50-400	Uruguay	250
Mauritius	1000	Sri Lanka	300	Denmark	1000-3000
Brazil	2000	Ecuador	8	New Zealand	16.76
Columbia	50	Chile	80	Korea	500-1000
Australia	100	Greece	40	Israel	1000-2000
Brunei	1000	Sweden	100 (prohabit building)	Mexico	Range where waves affect groundwater
USA	depending on region and purposes	China	different from region and purpose	Philippines	Coastal administrative area

http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0473pdf/ks047304.pdf

Main roles of coastal area

Population and industry concentrate in the coastal areas.

➢ Roles of coastal area

- Regional revitalization
- Exchange base

Examples:

- Airport
- Port (Harbor)
- Fishery
- Trade window with foreign countries
- Complex facilities (amusement park, aquarium, shopping mall)

Chubu Centrair International Airport

https://www.pref.aichi.jp/uploaded/image

Purposes of coastal area development

Using coastal area for sustainable development

Concretely

✓For sustainable human life

It is necessary to position humans as a part of the ecosystem components and to preserve the coastal ecosystem.

✓For much better human life

In addition to keep stable economic development, the role of costal area as recreation places is an very important.

Problems of coastal area development

Artificially-derived

- Water pollution
- Decrease of tideland
- Garbage by human activities…etc.

Naturally-derived

- Coast erosion
- Drifting garbage to the coast

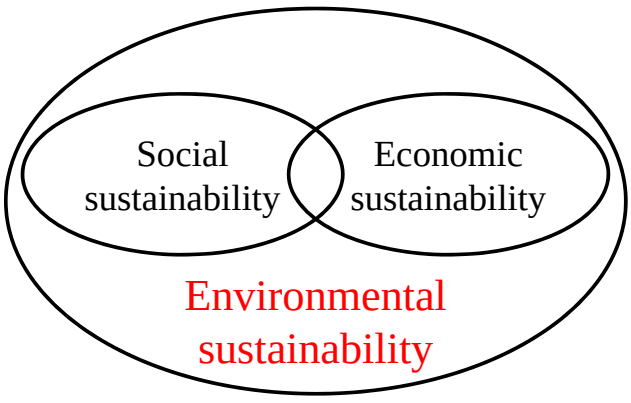
Efforts are needed!!

https://www.umeshunkyo.or.jp/209/271/index.html

Definition of environmental assessment

Definition

Environmental Assessment is to forecast and assess the influence of human behavior on the environment in advance



If environment is destructed, healthy human activities cannot continue.

Environmental assessment is essential for sustainable development

Environmental assessment

※So far, the environmental impact assessment was conducted just before the project was implemented.

➢ Strategic Environmental Assessment; SEA (2011)

Assess development activities from viewpoint of policy and planning stage with taking into account environment.

- Currently it is mainly implemented in developed countries, but it is expected to be done in developing countries in the near future.

Efforts for a better environment in coastal area

- Creation of artificial habitat for living things
- Underwater afforestation
- Promotion of rising bottom of sea water

Especially…

- Restoration and creation of the coastal growth environment of tidal flats and seaweed beds

http://fieldnote.harazaki.net/images/amamo1.jpg

International Efforts

PEMSEA（Partnerships in Environmental Management for the Seas of East Asia）

- Purpose of strengthening cooperation among countries concerning sustainable development in harmony with environmental conservation in East Asian waters
- 12 countries participated from 1994 under IMO (International Maritime Organization) and UNDP (United Nations Development Program)
- Sharing knowledge and experience on marine environment, conduct activities based on cooperation / partnership between officials, people, and experts in each country

https://www.spf.org/oprij/projects/information/forum/backnumber/pdf/31_01.pdf

Japan

Past situation of coastal area development

-1880s

Fishery, fishing port, commercial port, reclamation for agriculture

https://qkojimawan.jimdo.com/%E6%95%99%E7%A7%91%E6%9B%B8%E3%81%AE%E4%B8%AD%E3%81%AE%E5%85%90%E5%B3%B6%E6%B9%BE/

http://www.geocities.jp/shimizuke1955/371bezai2.html

1890s-1910s

Foreign routes became popular
Built landfill site
Urban → as residential areas
Harbor → for distribution facilities

Past situation of coastal area development

1910s-1940s
World War Ⅰ & World War Ⅱ

Along with the increase in military demand, heavy chemical industry developed.
→ Industrialization of ports advanced, landfill site for industrial use was built.

1955-1973
High economic growth period

The location of the factory was closed to the Pacific ocean
→ Led to shoreline topography change at same time caused obvious water pollution.

Development and Environmental Assessment

High economic growth led to deteriorate coastal environment.

Damage to the environment occurs with time difference.

Japanese government

Economic growth

Coastal ~~environment~~

As a result of ignoring the impact of development on the environment, serious environmental problems occurred throughout Japan

https://www.env.go.jp/policy/hakusyo/zu/eav10/eav100000000000.html

Current situation

1950s-1970s	Coastal environment was deteriorated
1973	High economic growth period ended
1993	The Basic Environment Law established
1997	Environmental Impact Assessment Law

Increased awareness of environmental considerations

2011	Regulations were set by each local government
Nowadays	Environmental assessment is carried out before developing coastal areas

Current situation

➢ Environmental assessment is not enough

Various problems occur

i. Eutrophication and poor oxygenation of bottom layer
ii. Disappearance of tideland and seaweed bed
iii. Contamination by hazardous chemicals

Environmental destruction

Managers:

- non-execution or lack of environmental assessment

Users:

- Lack of consideration for the environment

https://www.sankei.com/premium/photos/150722/prm1507220003-p1.html

Future plan (case of Nagoya port)

http://www.port-of-nagoya.jp/shokai/keikaku/koso/1001081.html

✓ This long-term concept was published in 2007.

✓ Target year is 2027.

✓ Nagoya port have set basic goal, policies and created future visions for five areas.

Goal is

“Radiant port Loved by the people”

Environmental assessment

Impact prediction and assessment of 2 types before actually starting construction

- Under construction

https://haveagood.holiday/articles/224

  - Generation of turbid water
  - Influence on animals and plants
  - Waste generation
  - Generation of noise and vibration
  - Generation of greenhouse gases

- After completion of construction
  - Changes in water quality and flow conditions
  - Impact on ecosystems
  - Change in landscape

China

Coastal areas distribution

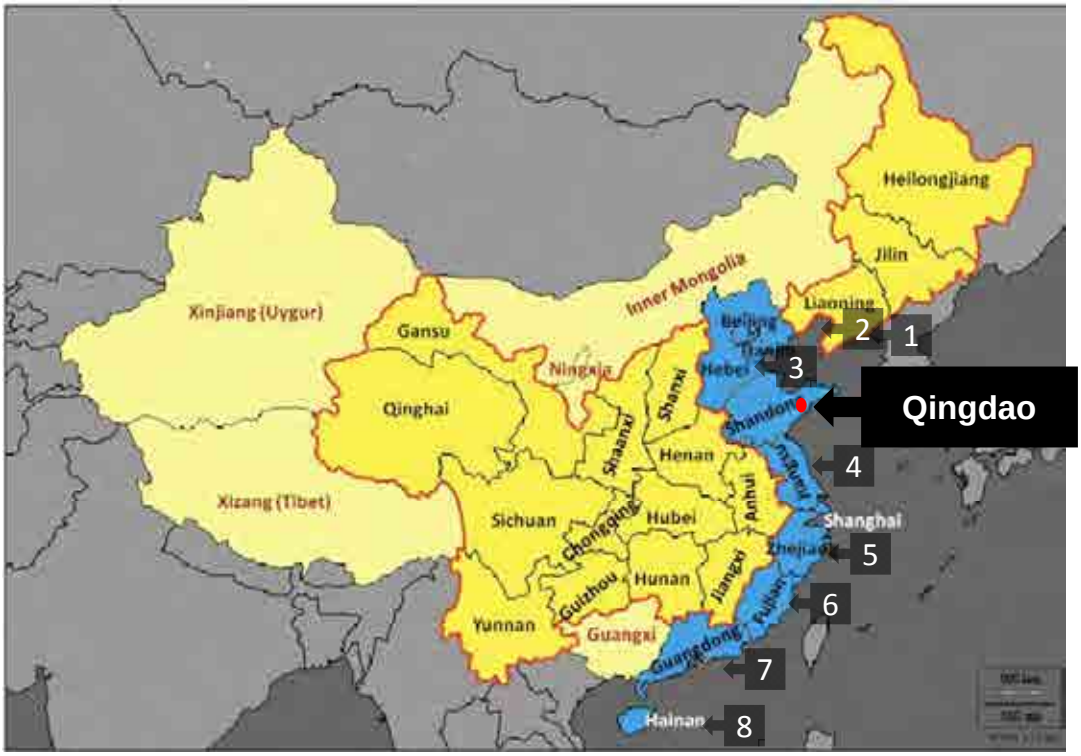
- ✓ According to China Marine Statistical Yearbook, coastal area can be divided into 3 types:

1. **Provinces (8)**
2. **Autonomous region (1)** (The Guangxi Zhuang Autonomous Region)
3. **Direct-controlled municipalities (2)** (Shanghai and Tianjin city)

- ✓ At present, there are 53 coastal cities and 242 coastal districts and counties in China.

https://baike.baidu.com/pic/沿海地区/1083210/0/203fb80e7bec54e71694752cbf389b504fc26a83?fr=lemma&ct=single#aid=0&pic=203fb80e7bec54e71694752cbf389b504fc26a83

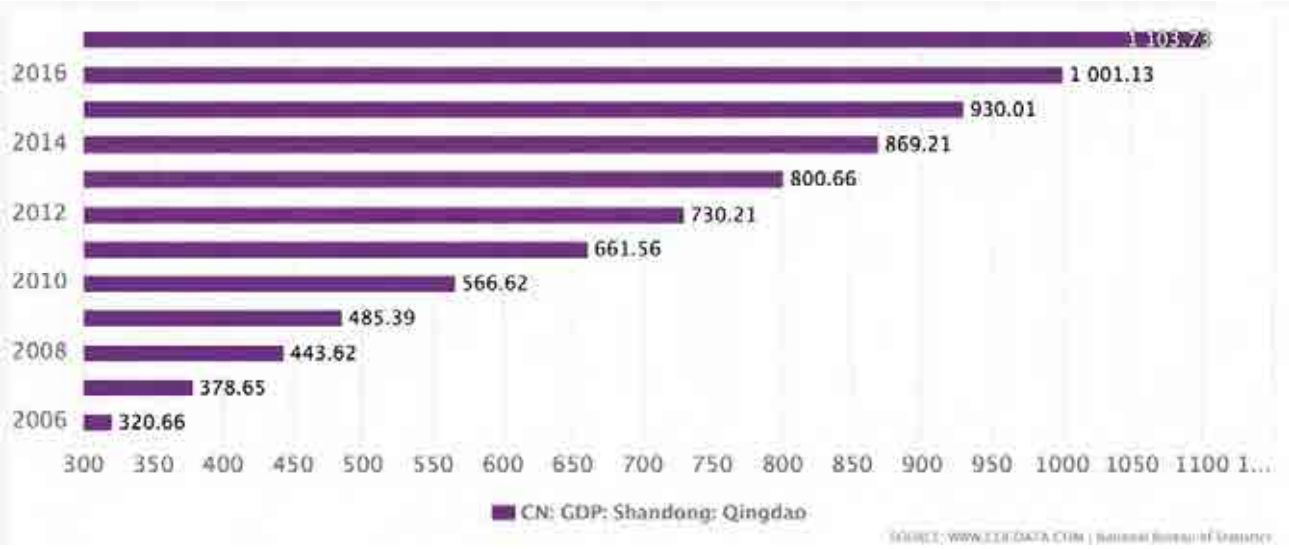
Coastal area distribution



Coastal provinces in China

http://www.cepii.fr/PDF_PUB/wp/2014/wp2014-04.pdf

GDP of Qingdao City



The GDP of Qingdao city was extremely increasing over the past years. And the economy is next only to Beijing and Tianjin (direct-controlled municipalities) in the northern cities.

Qingdao city in past time

Germany occupation period (1891–1914)	Japan occupation period (1914–1922)	ROC-ruled period (1922–1938)	Japan occupation period (1938–1945)
• The city was starting to take shape with the completion of construction of wharves, railway line and so on. • From 1910, it focused on the development of commerce.	• Exploitation of natural resource. • A number of schools, hospitals and public buildings were constructed.	• It consequently distinguished itself as a holiday resort and summer retreat.	• There were no much urban progress, although it was strived for the construction of the greater Qingdao.

Qingdao city at present time

After Second World War…
The city has been ruled under People's Republic of China

Since introduction of China's open-door policy to foreign trade and investment, Qingdao city developed quickly as a port city.

Additional information about Qingdao city	
• Total land area	11,282 km^2
• Urban area	4,996 km^2
• Water area	12,240 km^2
• Population (2017)	9,290,500
• Density	823 person km^{-2}

(Tokyo city: 6000 person km^{-2})

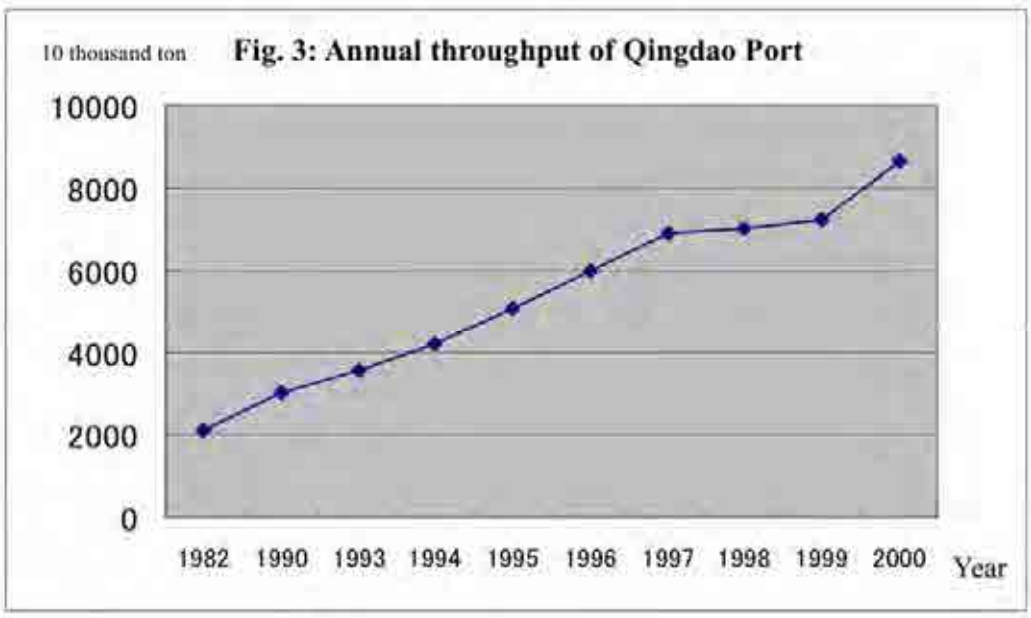
Qingdao Port

Japan occupation period (second period)

Present time

The **Qingdao Port** is a seaport facing the Yellow Sea, it was firstly established in 1892 (Germany occupation period). Qingdao port consists of four sites: **Dagang** port, **Qianwan** port, **Huangdong oil** port and **Dongjiakou** port.

Development of Qingdao Port



Source: Material provided by the implementing agency

The Qingdao port is prosperous under the lead of Chinese government. It is one of the ten busiest ports in the world (2010).

Qingdao airport

https://www.worldatlas.com/airports/cn/qingdao-tao.html

https://baike.baidu.com/pic/青岛流亭国际机场/4278281/0/d8f9d72a6059252d74008e133f9b033b5bb5b996?fr=lemma&ct=single#aid=0&pic=d8f9d72a6059252d74008e133f9b033b5bb5b996

Qingdao Liuting international airport was established in 1944. It is about 31 km from the city center and serves as a hub for Shandong airlines and Qingdao airlines as well as a focus city for Beijing airlines and China eastern airlines.

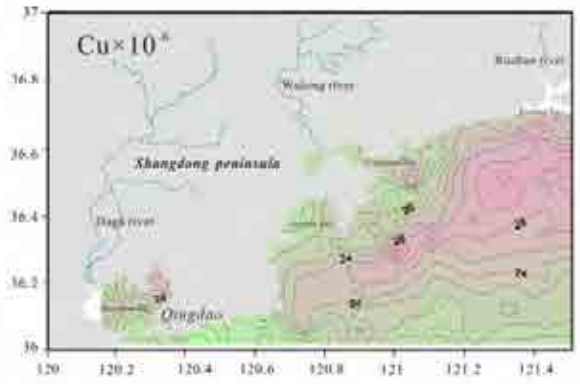
Environmental assessment

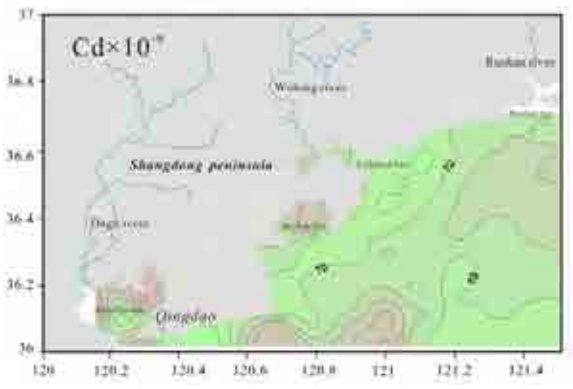
Because China mainly focused on economical development and protecting environment was neglected in most case, environmental assessment was not implemented before development.

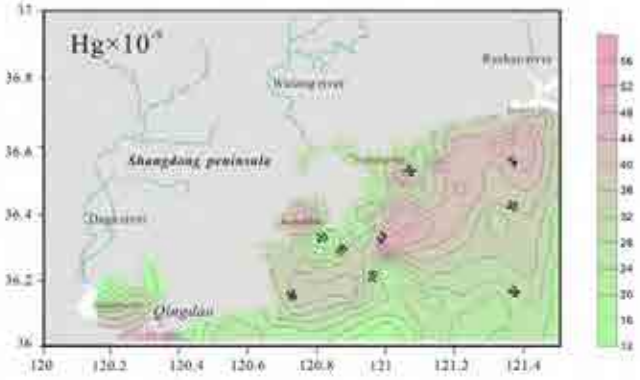
Rapid economic development led to various environmental problems.

https://news.qq.com/a/20120713/000740.htm

Environment assessment



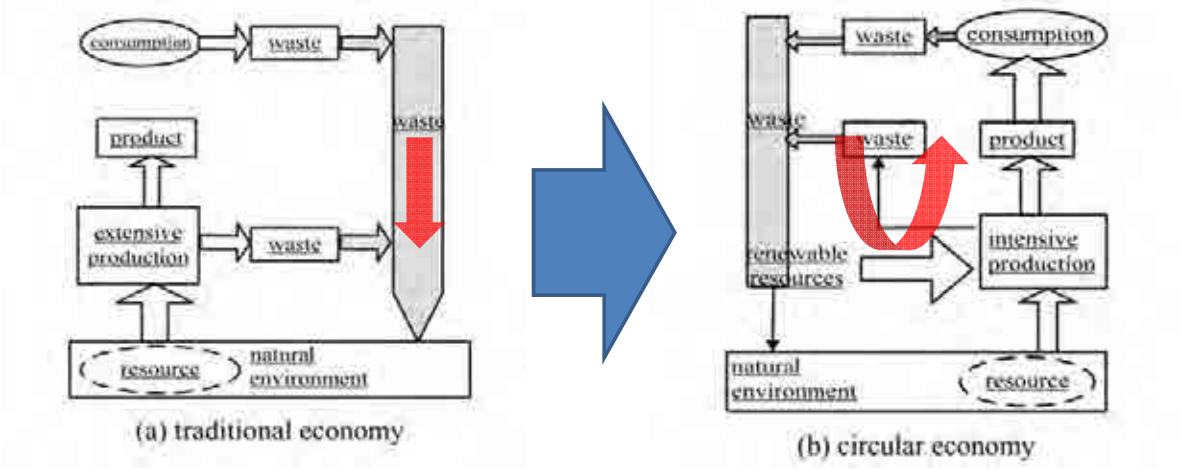




S. Liu et al. / Marine Pollution Bulletin 100 (2015) 483–488

- Marine surrounding Qingdao city has been polluted by heavy metals.
- Among them, Hg originated pollution is the most serious.

Eco-friendly circular economical system



(a) After consumption, waste is directly discharged into the environment.

(b) While in circular economical system, the waste is transformed into renewable resources.

https://pdfs.semanticscholar.org/2676/0c7a82b67a34496d9b80fd675c0d655e3091.pdf

Future development: new airport construction

https://en.wikipedia.org/wiki/Qingdao_Jiaodong_International_Airport#/media/File:China_Qingdao_location_map.svg

https://baike.baidu.com/pic/青岛胶东国际机场/4080653/6331351/060828381f30e924225dd61d4e086e061d95f725?fr=lemma&ct=cover#aid=6331351&pic=060828381f30e924225dd61d4e086e061d95f725

Qingdao Jiaodong international airport is estimated to complete in 2019. Characteristics: internet application for passenger, green building, stainless steel roof, ocean culture.

Environmental assessment for new airport

■ Environmental assessment was conducted on January 2015.

■ Items:
- ✓ Acoustic environment
- ✓ Air environmental impact
- ✓ Ecological impact analysis
- ✓ Surface water
- ✓ Groundwater
- ✓ Solid waste

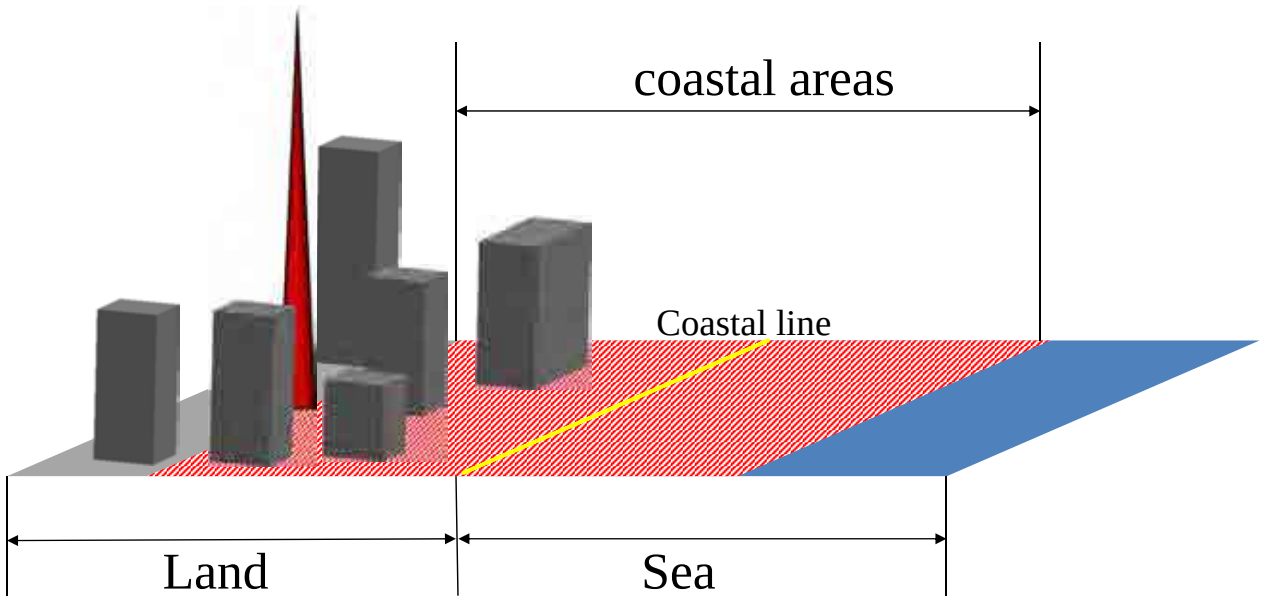
■ The report is available to public online:
http://www.sda.cn/uploads/1/file/public/201502/20150204080301_p0mldj04lk.pdf

Conclusions

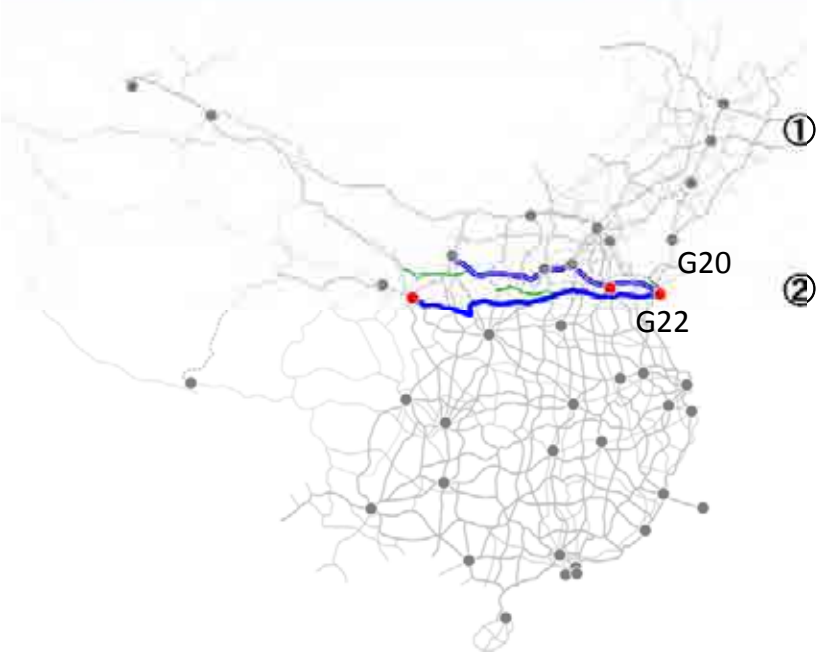
- ✓ Coastal area has many roles, and we should consider environment when we use coastal area.
- ✓ Environmental assessment has been mainly conducted in developed countries, it is necessary to carry out in developing countries in the future.
- ✓ In Japan, development that neglected the environment once has been carried out, but environmental assessment is done at the planning stage of each project.
- ✓ In China (Qingdao city), environmental problems was often ignored with rapid economical development. But nowadays, environmental assessment is necessary before development.

Discussion topics

- ✓What kind of coastal area development is carried out in your country?
- ✓Do you think the current environmental assessment in your country for coastal area is enough? And why?



Transport



① **G20 Qingdao-Yinchuan Expressway** (1610 kilometer; construction period: 2003–2006)

② **G22 Qingdao-Lanzhou Expressway** (construction period: 2002–2019)

https://en.wikipedia.org/wiki/G20_Qingdao%E2%80%93Yinchuan_Expressway#/media/File:G20_map.svg

Expressways started from Qingdao city are established in order to drive development of western regions.

Future development in Qingdao city

https://www.weibo.com/ttarticle/p/show?id=2309404091286876491705

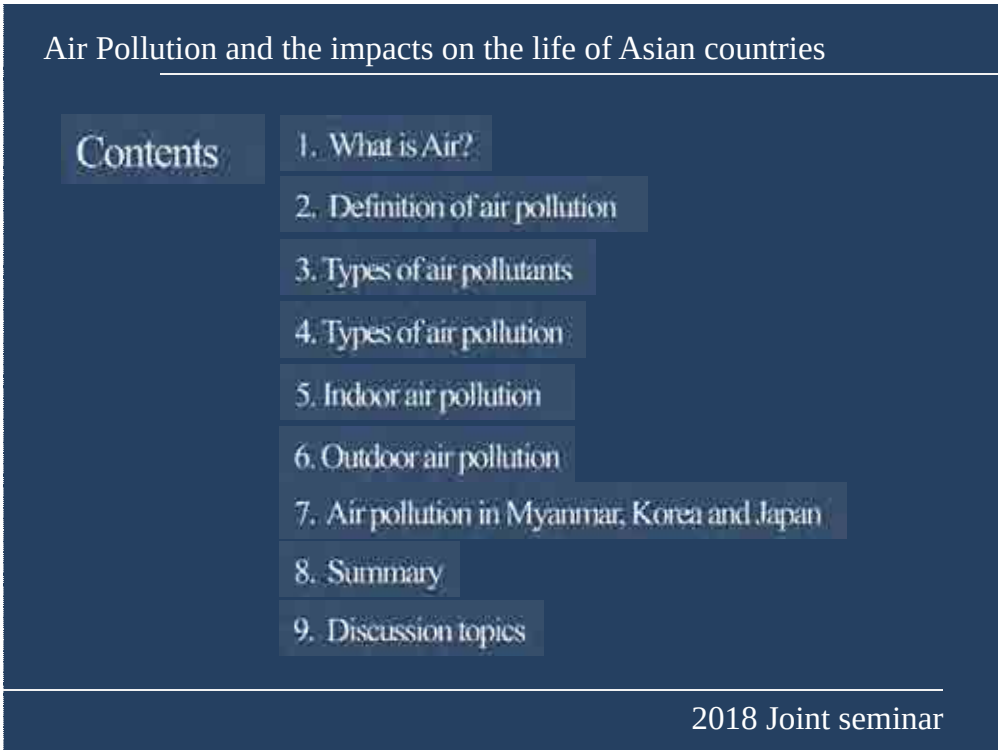
New bay city pattern

Blue economy

Joint seminar
2018. 05. 25

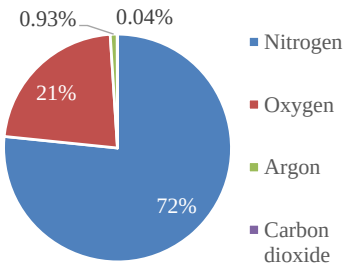
Air pollution and the impacts on the life of Asian countries

M1 ZAW MIN HAN
M1 YURI MATSUI
M1 SOYEON KANG



1. What is air?

Air is a mixture of gases and it is made up of Nitrogen (72%), Oxygen (21%), Argon (0.93%), Carbon dioxide (0.04%) and trace amount of Ne, He, CH4, Kr, H2 and H2O vapor, etc.



"We can not live without air "

Air is necessary for breathing. Especially, the World Health Organization states that breathing Cleaner air can reduce the risk of stroke , heart disease, lung cancer and so on.

2. Definition of air pollution

The condition in which air is **contaminated** by foreign substances which can be harmful for human and environment.

https://www.nationalgeographic.com/environment/global-warming/pollution/

https://www.youtube.com/watch?v=sAKyhfxxr7s

Air pollution is now one of the largest global health risks. The World Health Organization estimates that air pollution is responsible for up to **7 million deaths** every year.

3. Types of air pollutants

"Then, what matters affect our body and environment?"

Name	Definition	Main emission resources
Carbon monoxide (CO)	A colorless toxic gas that occurs when the carbon content is incomplete	1) Burning of fossil fuels 2) Forest fires 3) Kitchen, cigarette smoke
NO, NO_2	A toxic gas caused by nitrogen oxidation	1) Coal fired power plant 2) Cars, trucks
SOx (SO_2, SO_3)	A toxic gas produced by sulfur dioxide oxidation	Coal, petroleum combustion

https://www.epa.gov/criteria-air-pollutants

3. Types of air pollutants

Name	Definition	Main emission resources
Volatile organic compounds (VOC)	A cause of ground level ozone (O_3), which affects human body seriously	1) Industrial facilities 2) Electric utilities 3) Motor vehicle exhaust
NH_3	In response to sulfur oxides, it produces secondary air pollutants	1) Livestock sector 2) Agriculture sector 3) Human activity
PM (Particulate Matter)	A complex mixture of extremely small particles (PM2.5, PM10..)	Several resources Ex) - construction sites - unpaved roads - smokestacks

https://www.epa.gov/criteria-air-pollutants

4. Types of air pollution

Air Pollution

Indoor Air Pollution

Main emission resources

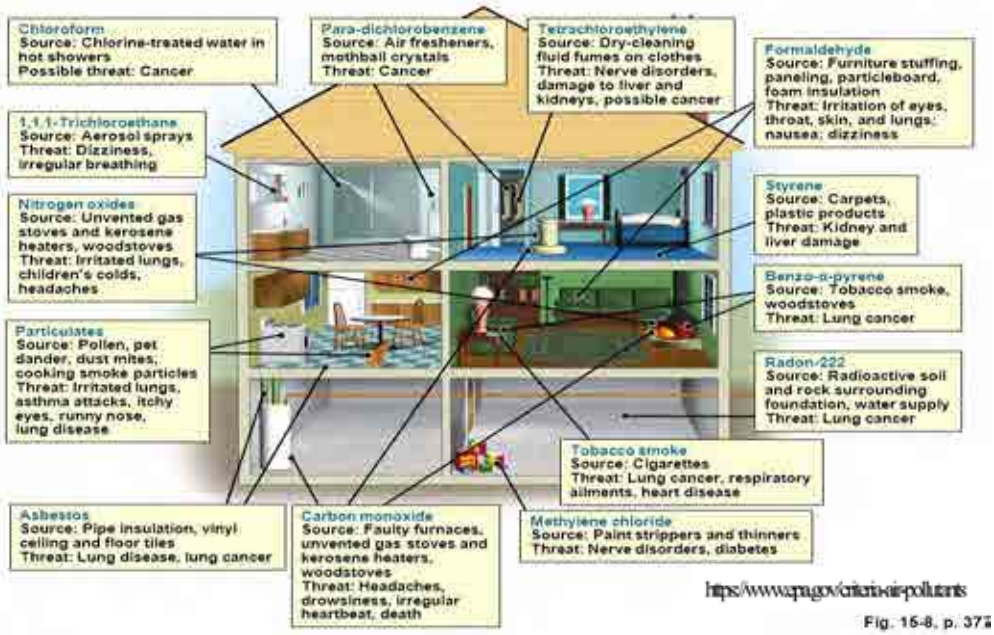
- **Combustion sources**
- **Tobacco smoke**
- **Building materials**
- **Furnishings**
- **Household cleaning**
- **Personal care products**
- **Underground sources…**

Outdoor Air Pollution

Main emission resources

- **Natural disasters**
- **Transportation**
- **Energy production**
- **Industries**
- **Agriculture…**

5. Indoor air pollution



https://www.epa.gov/criteria-air-pollutants

Fig. 15-8, p. 373

Indoor air pollution in case of developing country

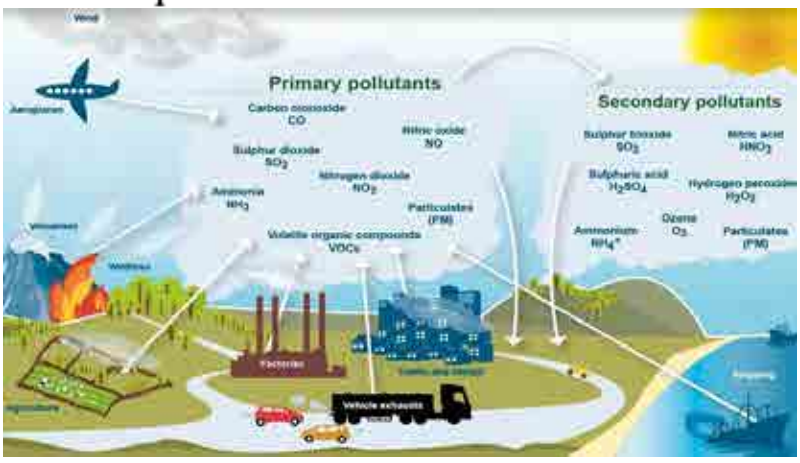
Still three billions people in developing countries rely on fuels and devices - such as biomass, coal, wood, and dung in simple stove – for their daily cooking,- kerosene for lighting a lamp and heating a room and also tobacco smoke etc.

https://www.epa.gov/criteria-air-pollutants

"Especially, women and children in developing country are being exposed to these harmful air pollutants"

Harmful air pollutants which are produced by burning materials like coal, wood are affecting human health and natural environment.

6. Outdoor air pollution

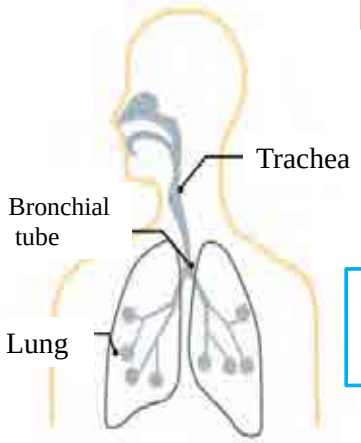


https://www.epa.gov/criteria-air-pollutants

Primary pollutants emitted by several resources enter directly into the atmosphere. When the primary air pollutants react chemically with one another or with natural components of the atmosphere, secondary pollutants are produced. It also affects air quality.

How air pollutants affect human health?

http://www.gaiki-seijouki.jp/pm25/damage/



Main diseases elicited by air pollutants

- Respiratory diseases Ex) Emphysema
- Cancers
- Cardiovascular diseases Ex) Heart failure arrhythmia
- Air pollutants
- Eye diseases Ex) Dry eye
- Allergies
- Fire extinguisher diseases Ex) Intestinal obstruction

7. Air pollution in Myanmar

Geographical Background of Myanmar

Ethnically diverse nation, 135 races

Rich natural resources

Total land area : 676,577 square kilometer,
Largest country in the mainland Southeast Asia

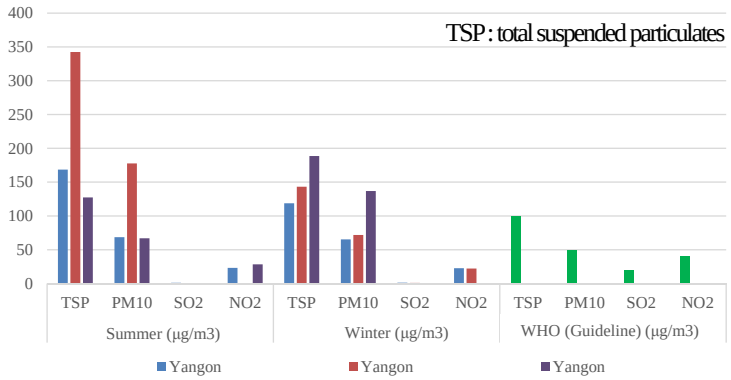
40% of the total land area still covered by forest

Total population : 51,486,253
70% of the population live in rural area
30% of the population live in an urban area

Outdoor Air Pollution in Myanmar

The first air quality was monitored in two major cities, Yangon (7 million people) & Mandalay (2 million people) in 2007 & 2008 by UNDP (United Nation Development Program).

Ambient air quality in Yangon in 2007
(daily average, 3-day sampling period)

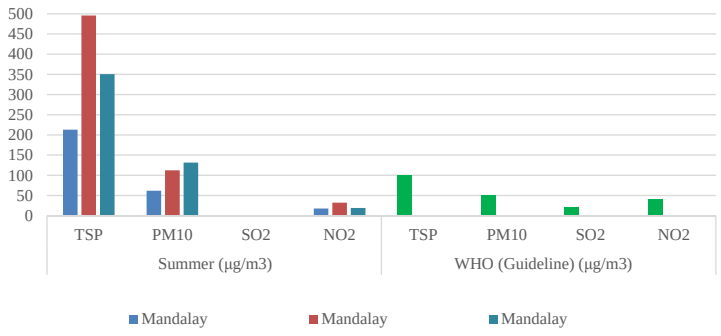


https://www.epa.gov/criteria-air-pollutants

Air pollution in Myanmar

Outdoor Air Pollution in Myanmar

Ambient air quality in Mandalay in 2008
(daily average, 3-day sampling period)



TSP (total suspended particulates) value of Commercial areas in two cities during summer are significantly higher than WHO guideline because of motor vehicle emission (traffic congestion) in these areas.

https://www.epa.gov/criteria-air-pollutants

Air pollution in Myanmar

Greenhouse Gas Emissions in Myanmar

Myanmar currently has negative net greenhouse gas emissions, largely due to its forestry sector removals in remaining forest stand.

Source/Sink	CO2 Removal (Gg)	CO2e total emissions (Gg)	CO2e Net emissions (Gg)
Energy sector	0	7,860	7,860
Industrial sector	0	460	460
Agricultural & Livestock sector	0	22,840	22,840
Land use change and forestry sector	142,220	40,400	**-101,820**
Waste sector	0	2,830	**2,830**
Total	142,220	74,400	**-67,820**

https://www.epa.gov/criteria-air-pollutants

Myanmar's forests currently offer valuable carbon sequestration to the rest of the world.

Air pollution in Myanmar

1. Myanmar still has a highly rural, agro-based economy, for this reason, the air quality is generally good.
2. Air pollution is becoming a problem in urban areas.
3. So far, Myanmar doesn't have permanent air quality monitoring system, only has mobile air quality monitoring system.
4. Air quality management in Myanmar is still in its infancy.
5. National air quality standards and a national air quality monitoring network has to be established.

7. Air pollution in South Korea

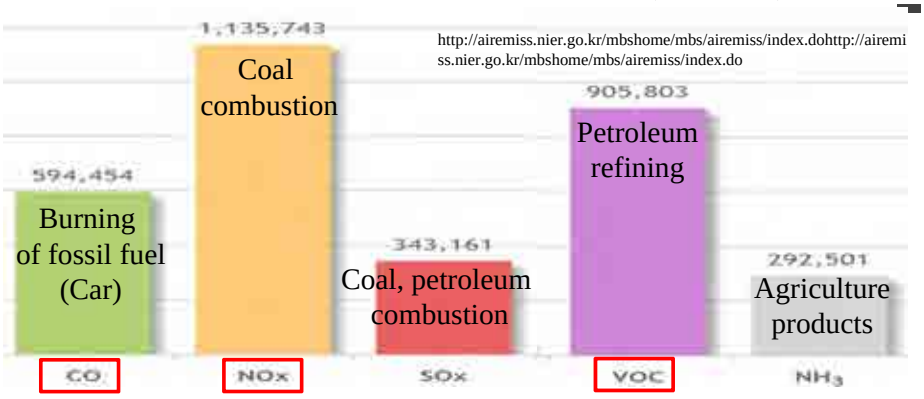
http://koreabizwire.com/korea-china-japan-to-step-up-cooperation-on-air-pollution/92769

https://www.independent.co.uk/travel/news-and-advice/seoul-free-public-transport-reduce-air-pollution-smog-south-korea-government-commuting-hours-a8163741.html

According to 2016 Environmental Performance Index (EPI) compiled by Yale and Columbia universities in collaboration with the World Economic Forum, South Korea ranks a lowly **173rd** out of 180 countries in terms of air quality.

Recently, deteriorating air pollution is an argent problem for Korea government.

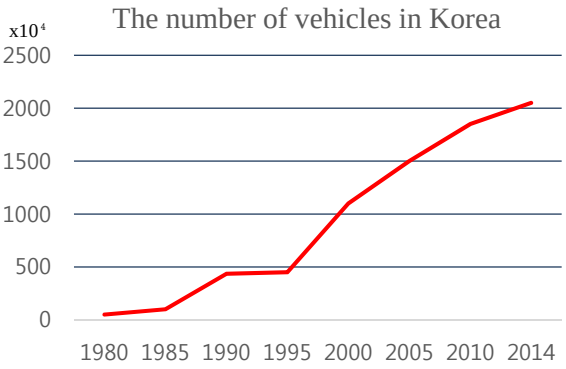
Pollutant emissions in 2014 and its main causes (unit : ton)



This graph shows the amount of air pollutants emitted from Korea and the sources of air pollution. According to the National Institute of Environmental Research in Korea, **NOx, mainly originated from burning coal was the largest pollutant emission in 2014**, followed by VOC emitted mainly from petroleum refining, and third one was CO.

Cause1. Heavy traffic

*" **Heavy traffic and air pollution** is a part of everyday life in Seoul " – Times core*



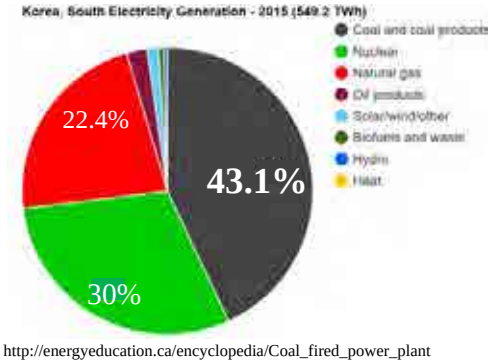
http://www.road.re.kr/analysis/analysis_01_1.asp?main_no=5&sub_no=2

- According to Ministry of Land of Korea, the number of vehicles started to increase rapidly in 1995.
- In 2014, **Over 20 million vehicles** have been sold and the number of vehicles in Korea is still increasing.

Also, the number of personal cars per person is **2.46** which is much higher than OECD average, **1.5**. That means that Korea has double vehicles compared to other OECD countries like Japan (**1.6**) or Germany (**1.7**).

Cause2. Lots of coal fired power plants

*Korea is small, but has **high population density***



http://energyeducation.ca/encyclopedia/Coal_fired_power_plant

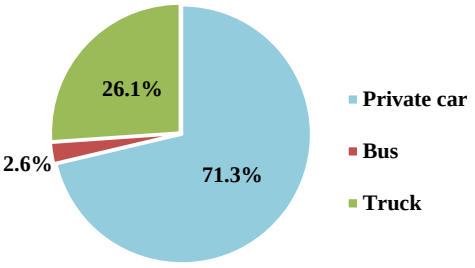
Although Korea's land area is very small ranking 109 in the world for land area, Korea has too many people living in the limited land space. Especially, the **population of Seoul** (12 million) has reached its maximum.

In order to supply sufficient electricity, South Korea has produced **40%** of total electricity by using **52 coal fired power plants.** These coal fired power plants are thought to be the main cause of NOx which occupies the largest part of Korea's air pollutants.

Solution 1. Zero or Low emission vehicle program

Because more than 70% of cars in Korea are private ones, Korea government has started to implement programs on eco-friendly private car.

The type of car in Korea



http://www.road.re.kr/analysis/analysis_01_1.asp?main_no=5&sub_no=2

http://www.lt-rentacar.net/review/view.asp?SEQ=321&Page=1&Category=2

In 2017, Korea government introduced a new program called as **Zero or Low emission vehicle program.** Zero or low emission vehicle represents a vehicle with low levels of pollutant emission like NOx.

Solution 1. Zero or Low emission vehicle program

A purchase grant
An electric car
Hybrid car
Hydrogen car

A tax cut
Acquisition tax
Excise tax

The program encourages the public to purchase zero or low emission vehicles by providing several advantages. For example, those who purchase low-emission cars can receive grant up to **12 million won (1.2million yen)**. In addition, purchaser can get a tax cut about vehicle. As the number of purchasers is increasing, the government predicts that the program would contribute to reduce NOx emission from private cars.

Solution 2. Shutdown old coal fired power plants

Old power plant

http://news.naver.com/main/read.nhn?mode=LSD&mid=sec&sid1=004&oid=366&aid=0000369589

Older coal fired power plant emits more nitrogen hydrocarbons than new one. So, the Korea government is shutting down coal fired power plants which have been running for more than **30 years** and trying to reduce emissions of nitrogen hydrocarbons.

Through these solutions, Korean government is making efforts to improve air quality in Korea.

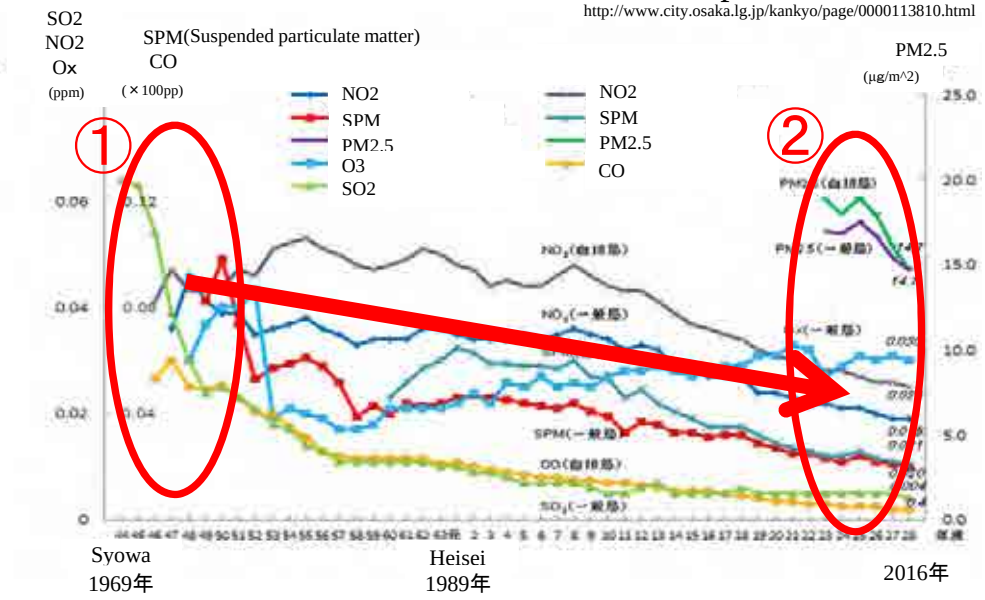
Causes and solutions of air pollution in Korea

1. Recently, poor air quality has become an urgent issue for Korea government.
2. Research result shows that heavy traffic and coal fired power plant are main causes of air pollution in Korea.
3. To deal with heavy traffic and coal fired power plant problems, government had come up with new vehicle program and shutting down old coal fired power plants.
4. Korea government is trying to reduce air pollutant emissions for better air quality and human health in Korea.

7. Air pollution in Japan

Air Pollutants from 1969 to 2016 in Japan

http://www.city.osaka.lg.jp/kankyo/page/0000113810.html



1. High economic growth period（1960-）

Cause of air pollution since 1960

- **Industrial reconstruction with coal as the main energy**

→ It causes air pollution problems mainly in <u>dust</u> and <u>sulfur oxides (SOx)</u> in various places.

- **<u>NOx</u> emitted from diesel vehicles**

With these….

- The visibility was only 30 to 50 m
- A car could not drive without lighting even during the day
- There was a stinky smell due to sulfur oxides

Air pollution in Japan

1. High economic growth period（1960-）

- Yokkaichi Asthma -

Collective asthma disorder caused by air pollution from Yokkaichi Complex (Japan's first petrochemical complex) in Yokkaichi City and Kusuna-cho of Mie Gun, Mie Prefecture

Symptoms : Stuffiness
Throat pain
Intense asthma

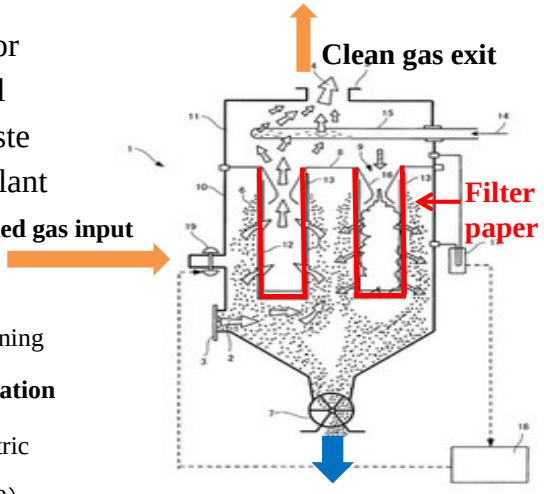
※ A very sever asthma already led to death.

※ There were cases in which heart attack and lung cancer occurred at the same time.

1. High economic growth period（1960-）

How could Japan solve air pollution problem in the 1960s?

Dust collector: Equipment for separating discharged harmful particulate matters from a waste incinerator and steelmaking plant



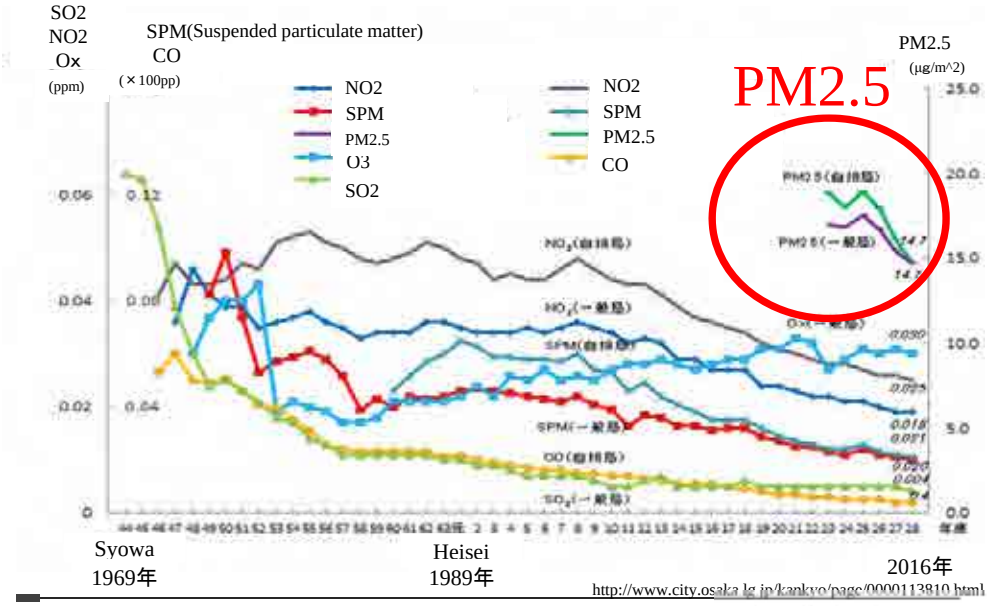
http://www.ekouhou.net/disp-A,2009-213973.html

6 types of dust collector

- Gravity
- Inertia
- Centrifugal
- Cleaning
- **Filtration**
- Electric

※Air pollution control law（1968）

2. Current situation of air pollution in Japan



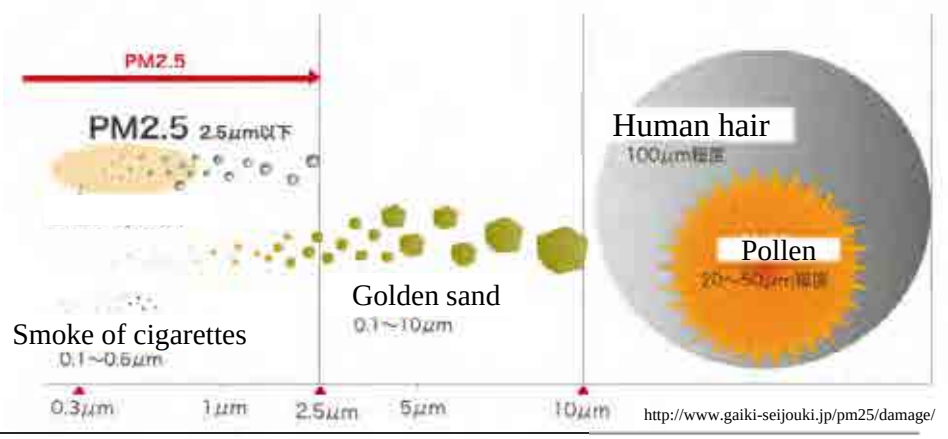
http://www.city.osaka.lg.jp/kankyo/page/0000113810.html

Air pollution in Japan

2. Current situation of air pollution in Japan

A fortieth part ($\frac{1}{40}$) of Human hair

PM2.5 (fine particle, size of 2.5 μm or less)



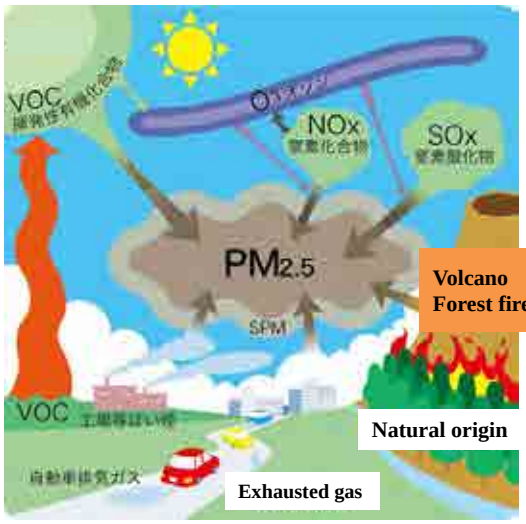
http://www.gaiki-seijouki.jp/pm25/damage/

Air pollution in Japan

2. Current situation of air pollution in Japan

http://www.city.amagasaki.hyogo.jp/kurashi/kankyo/kogai/034taikankyou.html

Where PM2.5 comes from?



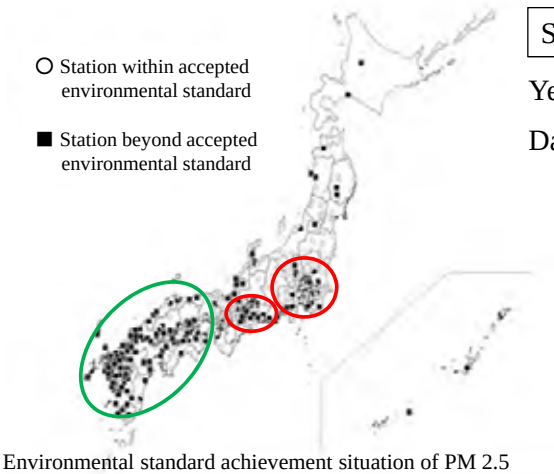
- ✓ Smoke emitted from factory.
- ✓ Exhausted gas emitted by car.
- ✓ Natural disaster.
  Ex) Volcanic activity.
- ✓ Burning field.
- ✓ Secondary pollutants generated by chemical reaction of atmospheric gases.

…..etc.

Air pollution in Japan

2. Current situation of air pollution in Japan

※ Atmospheric environmental standard (2009)



Environmental standard achievement situation of PM 2.5

Standard value

Year average : less than 15μg/m^3

Day average : less than 35μg/m^3

Area station beyond accepted environmental standard

- ✓ West Japan is affected by PM 2.5 from China
- ✓ Metropolitan area

Both domestic measures and cross-border pollution control are necessary

http://www.soumu.go.jp/main_content/000417381.pdf

Summary

1. Air is one of the most important components in our life.
2. There are various air pollutants like CO, SOx, NOx, CO_2.
3. For air pollution, there are two types, indoor and outdoor.
4. Air pollutants affect human health.
5. Although the amounts of air pollutants in major cities of Myanmar exceed WHO guide line, air is quite clear, and air quality is much better than developed country because of lots forest.
6. Because of heavy traffic and coal fired power plant, air quality in Korea is poor.
7. Recently, PM2.5 is becoming a serious issue in Japan instead of other air pollutants like SOx and NOx.

Discussion Topics

1. How to improve indoor air quality of your home?
2. How to mitigate air pollution in developing countries?
3. How to mitigate air pollution in developed countries?

Ozone Depletion and its Impacts on Life of Asian Countries

Presented by :
Aini Nurjanah (M1)
Muhammad Arifin (M1)
Tomoka Hayashi (M1)

GIFU UNIVERSITY

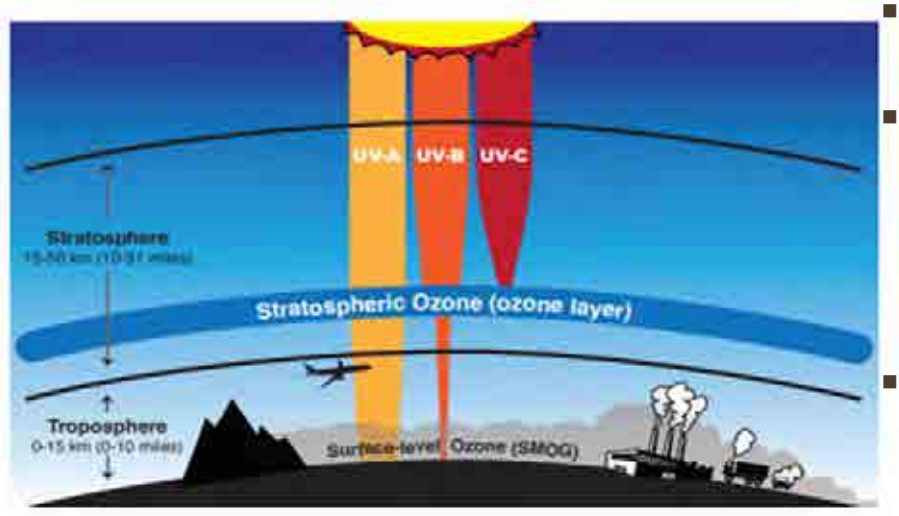
Outline

- Introduction of ozone layer
- Description of ozone depletion
- General impacts of ozone depletion
- How ozone depletion affect Asian countries life?
- Countermeasure to reduce ozone depletion
- Conclusion

Introduction of ozone layer

Ozone and ozone layer

- Ozone consist of three atoms of oxygen that bound together (O_3).
- Ozone is colorless and has a very harsh odour
- The ozone layer is a layer in Earth's atmosphere which contains relatively high concentrations of ozone (O_3)

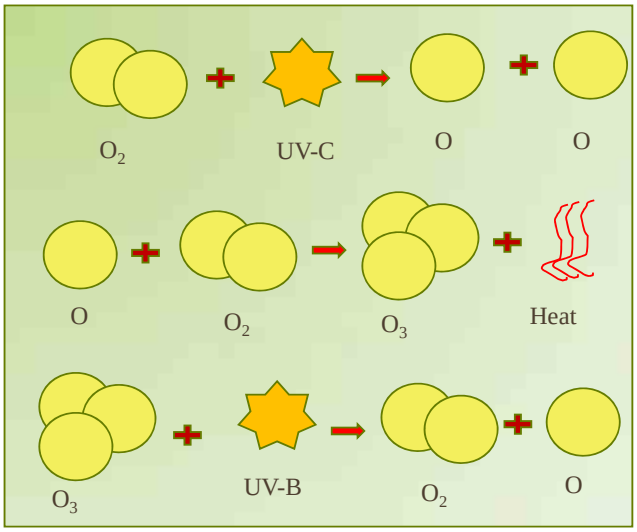


Ozone layer in Stratosphere

- Mostly found in Stratosphere
- It protects us from harmful ultraviolet radiation (UVR divided into: UV-A, UV-B, UV-C)
- Ozone layer's average thickness is 300 Dobson Units (DU) or 3 millimeters thick

Reference:
https://aura.gsfc.nasa.gov/ozoneholeposter/Ozone-Hole-Poster_hiRes_508.pdf

How ozone is formed?



Ozone layer formation

- Ozone primarily created by sunlight.
- When (**UV-C**) meets (**O_2**) molecule, the molecule will be split into 2 single atoms, known as atomic oxygen.
- This single atomic oxygen will combines with another to form ozone (**O_3**)
- As oxygen concentration in our atmosphere is abundant, so that "**ozone-oxygen cycle**" is continuously absorbing high-energy of ultraviolet radiation (UV-C) and completely blocking it from reaching the Earth's surface. This process creates heat which warms the upper part of the stratosphere
- However, if Ozone meets with UV-B, it will regenerate the oxygen. It happen when ozone absorb UV-B rays and splitting back into molecular and atomic oxygen.

Reference:
https://theozonereality.weebly.com/the-ozone-oxygen-cycle.html

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Description of ozone depletion

Ozone depletion

Ozone depletion is the damage of ozone layer due to human activity that released many harmful compound to environment that can attacks the ozone layers, its known as Ozone Depleting Substances (ODS).

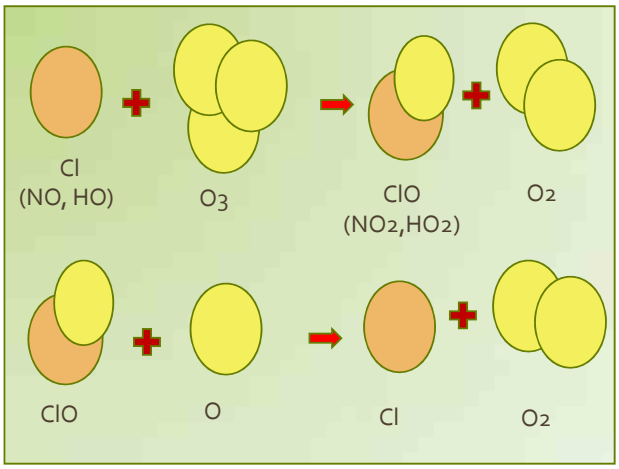
Ozone depleting substances (ODS) controlled by Montreal Protocol include:

- Chlorofluorocarbons (CFCs)
- Halon
- Hydrofluorocarbons (HFCs)
- Hydrobromofluorocarbons (HBFCs)
- Hydrochlorofluorocarbons (HCFCs)

However, scientist reveal the other gas which potentially trigger ozone depletion, e.g:
Nitrous oxide (N_2O)

How ozone layer is depleted?

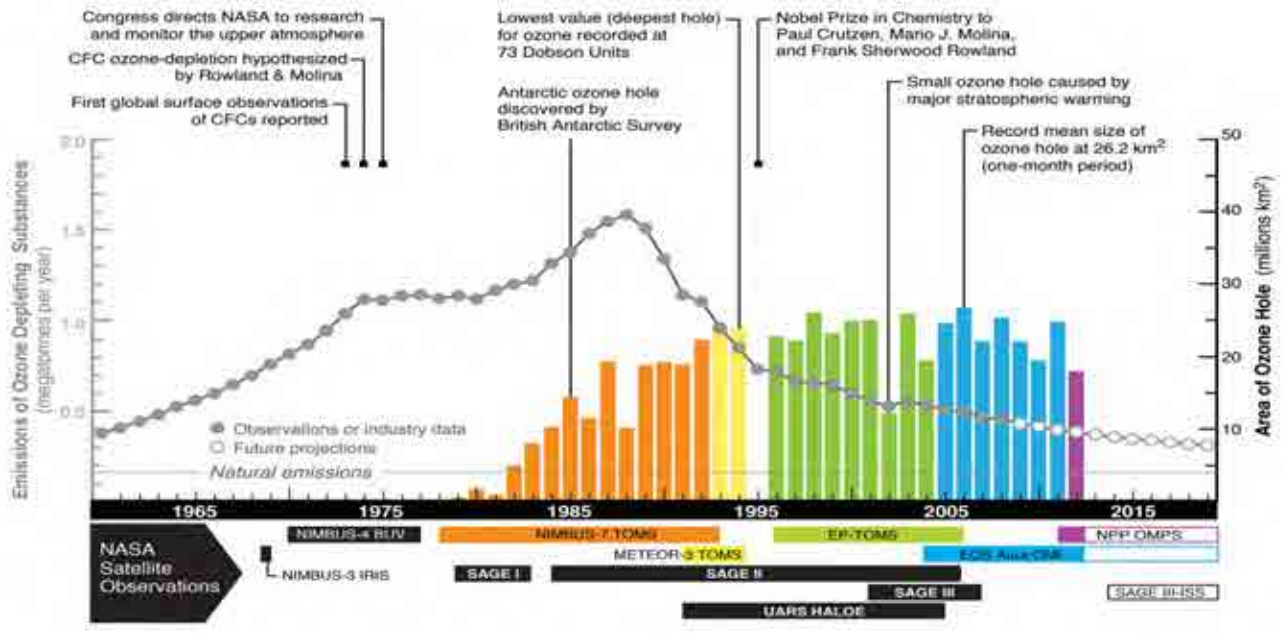
- CFCs are one group of notorious substances that can destroy ozone.
- Actually CFCs are stable molecules, but when this molecules exposure by UV radiation in the stratosphere, CFCs break them apart, then release chlorine atoms.
- Chlorine atoms (Cl) will react with ozone molecules, taking one oxygen atom and form Chlorine monoxide (ClO) and leaving oxygen molecules (O_2).
- When Chlorine monoxide (ClO) encounters an oxygen atom, the oxygen atom splitting into Cl and O_2.
- Then it can destroy ozone layer and continuously deplete it.



Process of ozone layer depletion

Reference:
https://en.wikipedia.org/wiki/Ozone_depletion

Current situation of ozone depletion



If ODS increase, ozone hole area also increase. The ban of ODS decrease the ODS emission to atmosphere, however, to recover the ozone hole need time.

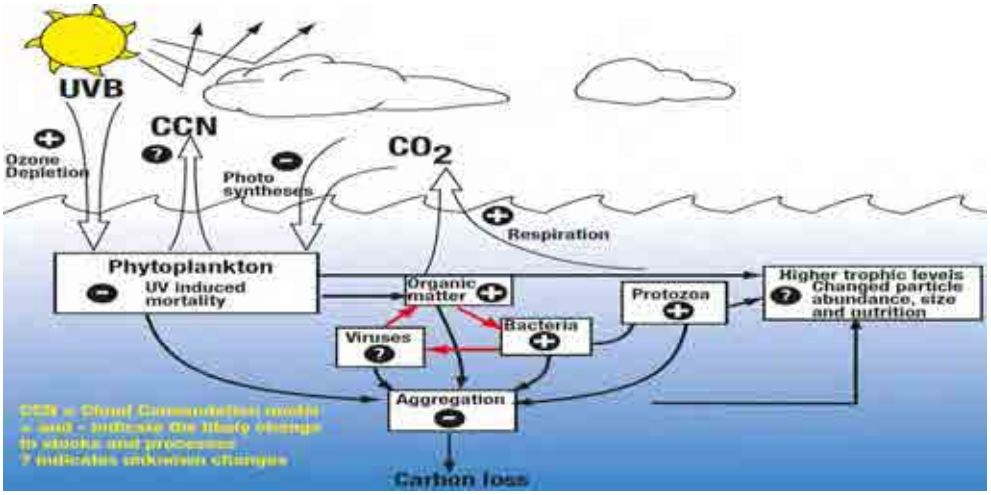
Reference:
https://aura.gsfc.nasa.gov

9

General impacts of ozone depletion

Impacts on ecosystems

1. Water ecosystem

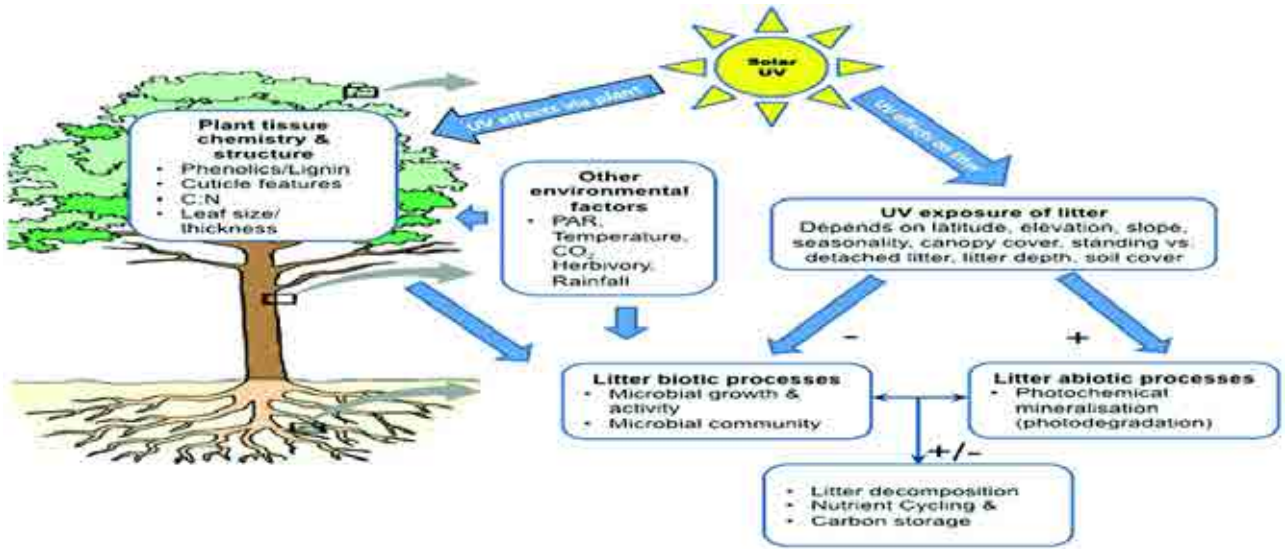


Impact of UVR to phytoplankton and water ecosystem

UV-B penetrates to the water environment and damages water organism, especially phytoplankton. UV-B radiation can change the structure and function of the microbial community, reducing the uptake of CO_2 by phytoplankton and increasing CO_2 release to the atmosphere.

References:
http://www.antarctica.gov.au/__data/assets/image/0019/112258/varieties/antarctic.png

2. Forest ecosystem

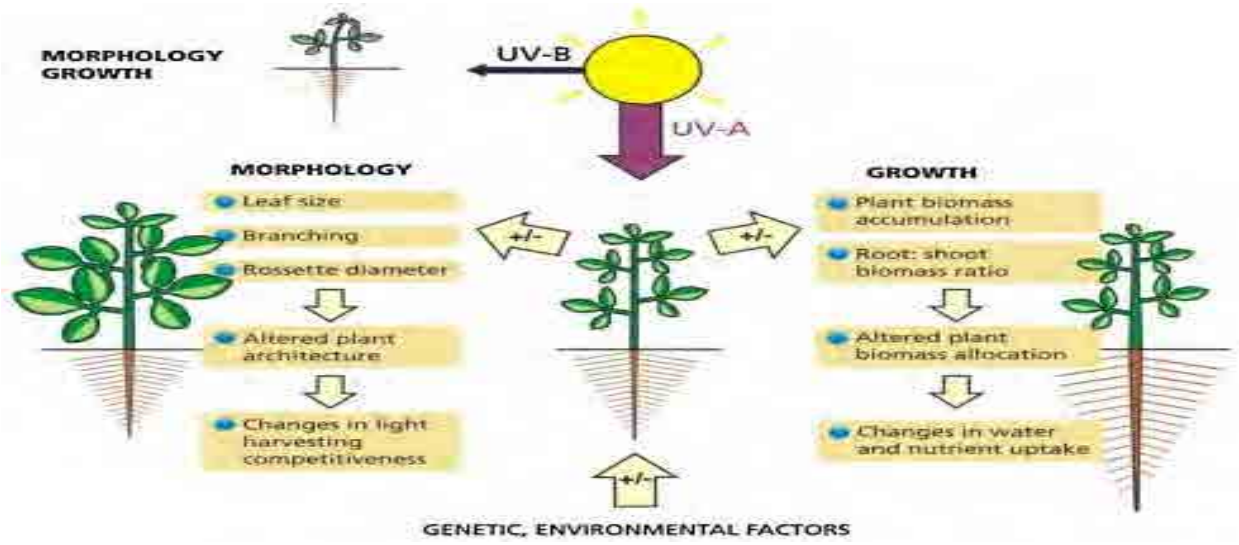


Impact of UVR to forest ecosystem

UVR will increase lignification in leaf. The abundant of lignin concentration in leaf will make decomposition process slower and it will effect to nutrient cycling process

References:
Bornman, F., Barnes, P. W., Robinson, S. A., Ballaré, C. L., Flint, S. D., and Caldwell, M. M. 2015. Solar ultraviolet radiation and ozone depletion-driven climate change: effects on terrestrial ecosystems. *Photochem. Photobiol. Sci.*14, 88-107. DOI: 10.1039/C4PP90034K.

3. Agroecosystem



Impact of UVR to Agroecosystem

- Reduction in the photosynthetic efficiency
- Damage the genetic material present in nuclei and organelle
- Inhibit plant growth and reduction in the yield
- Can enhances the pathogenicity of the organisms such as fungus

Reference: Verdaguer et al. 2016. UV-A radiation effects on higher plants: exploring the known unknown. Plant Science http://dx.doi.org/10.1016/j.plantsci.2016.11.014

Example of UV radiation effect on plant

- Slower stem extension rates
- Shorter internode lengths leading to shorter plant height
- Decreased of individual leaf size
- Increased leaf thickness
- Leaf chlorosis
- Increased epicuticular wax on leaf

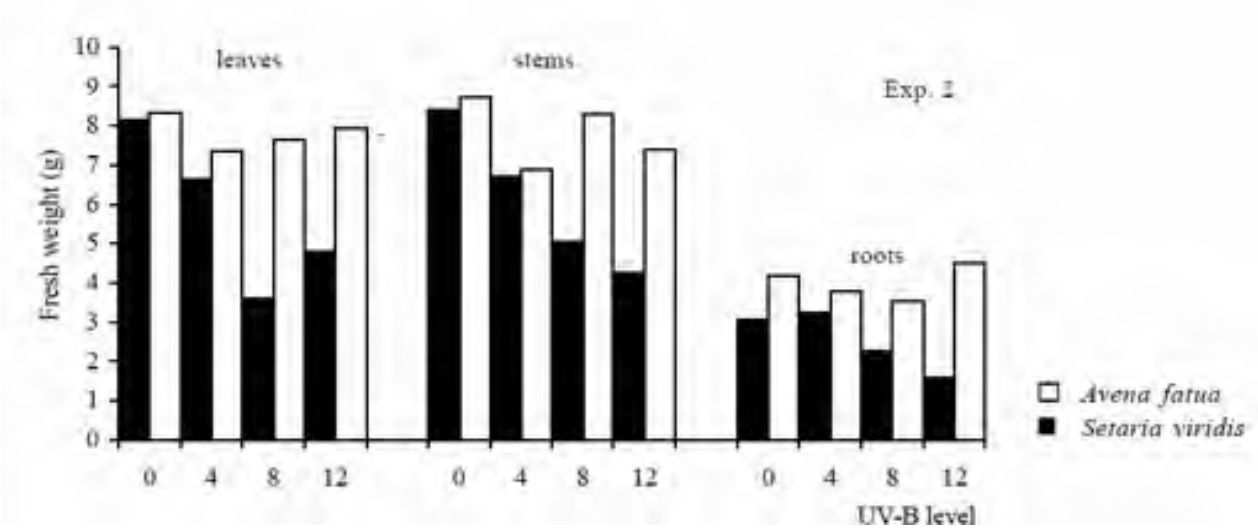
Leaf chlorosis

From the left 0, 4, 8 and 12 kJ/m^2/d UV-B

Zuk-Golaszewska K., *et.al Plant Soil and Environment* (2003)

Reference: https://upload.wikimedia.org/wikipedia/commons/thumb/e/e8/Frangula_alnus_with_magnesium_deficiency.jpg/128opx-Frangula_alnus_with_magnesium_deficiency.jpg

UV-B radiation that applied to the two species *Avena fatua* and *Setaria viridis* induced changes in leaf and plant morphology. It was a decrease of plant height, fresh mass of leaves, shoots and roots as well as leaf area



Effect of UV-B radiation on fresh parts of plants (leaves, stems, and roots) *Avena fatua* and *Setaria viridis*

References :
K. Zuk-Golaszewska, M.K. Upadhyaya, J. Golaszewski 2003. The effect of UV-B radiation on plant growth and development PLANT SOIL ENVIRON., *49*, (3): 135–140

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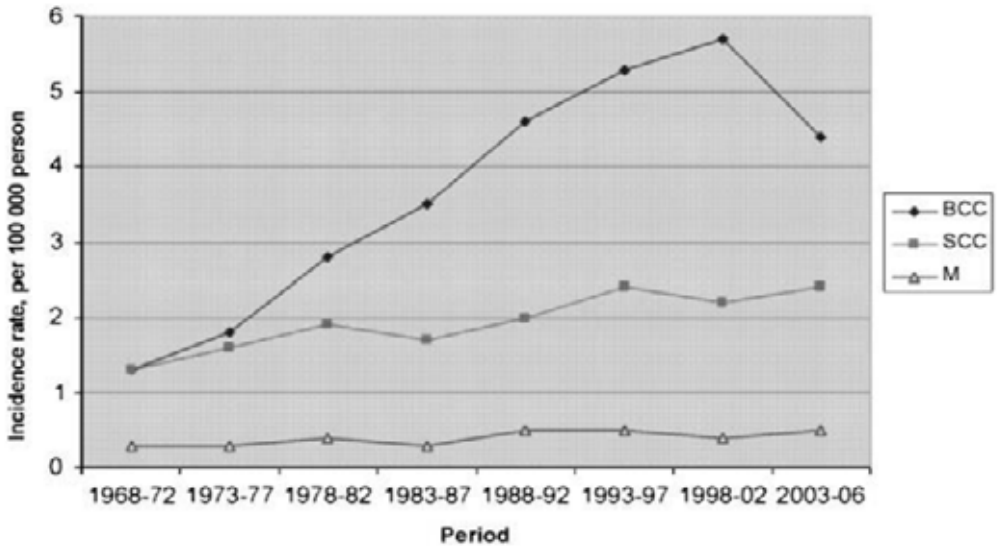
Impacts on Human Health

1. Skin cancer



Cases of Basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and melanoma (M) in Singapore from 1968 to 2006

- UVR is the major etiologic agent in the development of skin cancers
- UVR causes DNA damage and genetic mutations, which subsequently lead to skin cancer
- There are 2 types of Skin Cancer: Melanoma and Non-melanoma Skin Cancers

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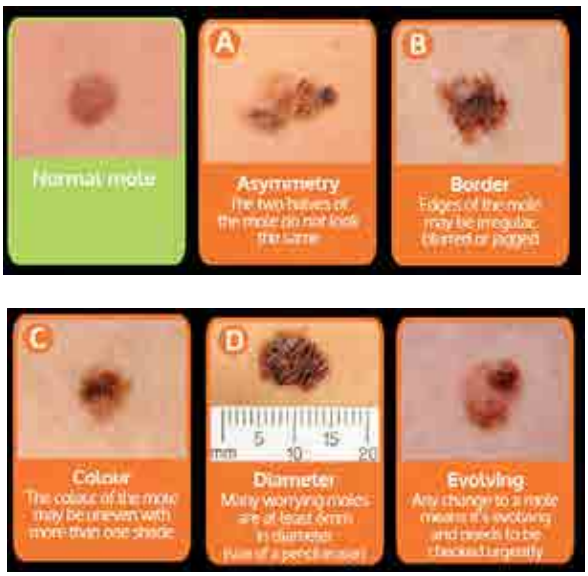
References : Narayanan DL, Saladi RN, Fox JL. 2010. Ultraviolet radiation and skin cancer. International Journal of Dermatology 2010, 49, 978–986.

Symptoms of skin cancer

Visual symptoms of skin cancer

Normal mole VS. Skin cancer



Distinguish between normal mole and skin cancer

References:
http://4.bp.blogspot.com/-4h_231rACz4/VV7p0ZoM2LI/AAAAAAAAAJXI/OOuOssogQ5c/s400/types_of_skin_cancer.png
https://tenovuscancercare.org.uk/media/810067/moles2.png

2. Eye diseases

Pterygium

is an epithelial conjunctiva bulbi and connective tissue growth that could cause vision problem

Symptoms of Pterygium

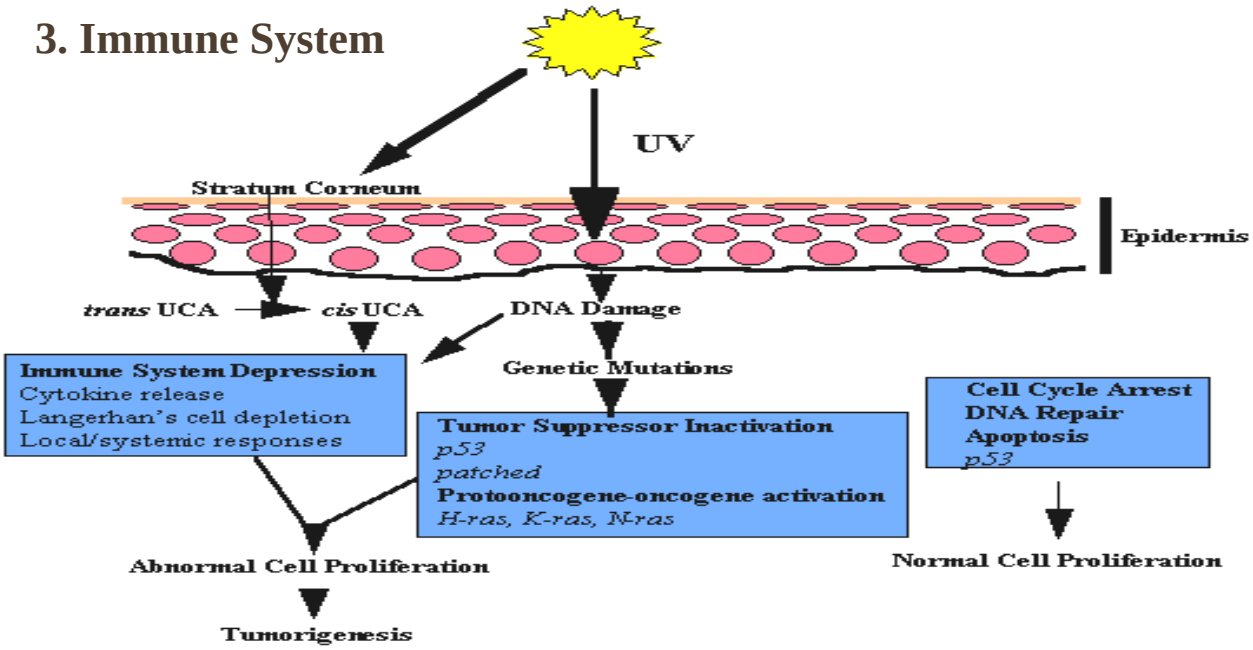
Cataract

is a clouding of the lens in the eye which leads to a decrease in vision

Symptoms of Cataracts

References:
https://upload.wikimedia.org/wikipedia/commons/6/61/Large_Pterygium.jpg
https://www.news-medical.net/image.axd?picture=2016%2F2%2Fclose_up_of_the_senile_cataract_during_eye_examination-ARZTSAMUI-590.jpg

3. Immune System



Impact of UVR to Imune system

- Exposure to UVR can also result in suppression of immune response to skin cancer, infectious diseases and other antigens
- The immune suppression is due to changes in skin photoreceptors and antigen presenting cells that are brought by UVR

References: Maglio DHG, Paz ML, Leoni J. 2016. **Sunlight Effects on Immune System: Is There Something Else in addition to UV-Induced Immunosuppression?**. BioMed Research International: 1-10. DOI: http://dx.doi.org/10.1155/2016/1934518

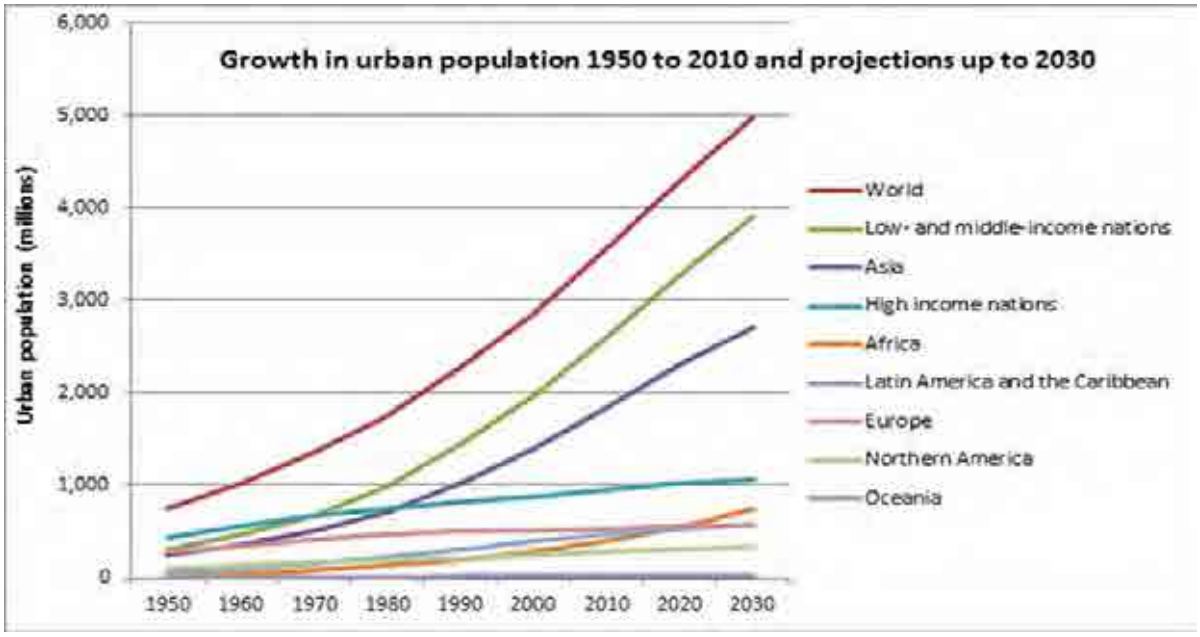
Beneficial effects of UV radiation

- The most positive effects of ultraviolet-B (UVB) is inducing production of vitamin D in skin
- Induction of cosmetic tanning (immediate pigment darkening, persistent pigment darkening and delayed tanning)
- Mood enhancing effects
- Use for phototherapy
- Pain relief

Reference:
Juzeniene A, Moan J 2012. beneficial effects of UV radiation other than via vitamin D production. Dermato-Endocrinology 4:2,109-117.landesbioscience.com

How ozone depletion affect Asian countries life?

Population in Asia



Growth in urban population in the world

More than 60% of world population lives in Asia

Reference:
Johson et al. 2013. Private sector investment decisions in building and construction: increasing, managing and transferring risks. DOI: 10.13140/RG.2.1.3479.2084.
https://www.researchgate.net/publication/298022705

Threats of ozone depletion to Asian countries

- Asia will face food security threat posed by UV radiation, threatened because the population growth high, however the food production by agriculture and fisheries is limited because of increasing of UV-Radiation
- The population growth rate in low and middle income nations are higher, resulted threats become more severe
- Health threat also will increase, however, no money to prevent and cure the disease

Countermeasure to reduce ozone depletion

CFCs, Halon and Methyl bromide

Example of products which contains CFCs, halon and methyl bromide

- Even though, CFCs, Halon and Methyl bromide have been banned in many countries, products which contain them still exist in the market worldwide.
- Awareness in checking material of the product before buying and using is the simplest way to reduce ozone depletion

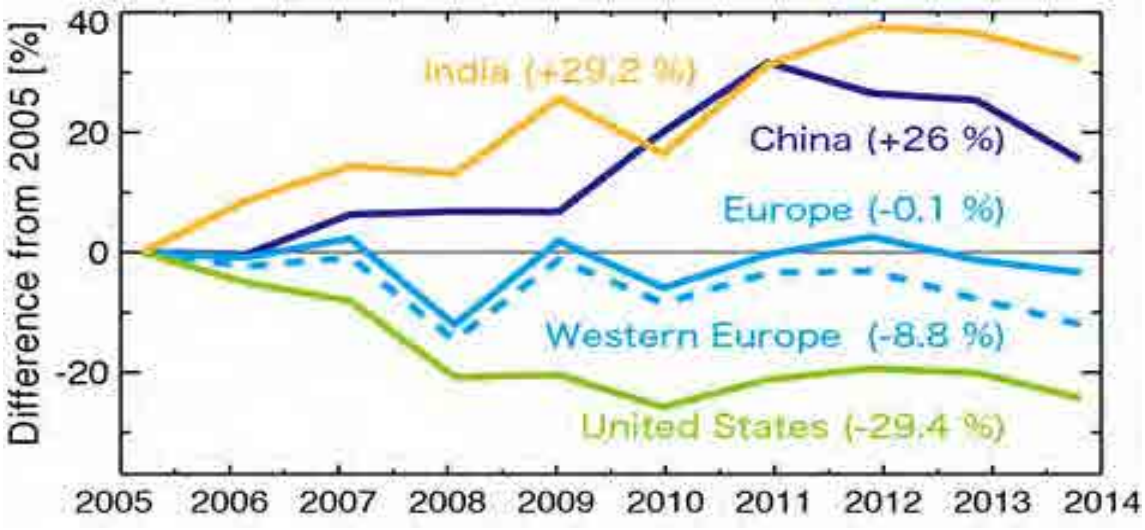
Reference:
http://www.theozonehole.com/ozonedestruction.htm

N_2O

Nitrous oxide emissions in several Asia countries

N_2O emission has the largest potential for promoting ozone depletion in the future. The substance like CFCs already started to control by Montreal Protocol, however, on the other hand N_2O don't control yet and the emissions are predicted to rise by years.

Reference:
https://www.jamstec.go.jp/e/about/press_release/20170127/



Variations in NOx emissions for major regions of the world

During the 10-year period of 2005-2014, there was a large increase in NO_x emissions in India and China (Developing countries). In other hand, emission regulations in developed countries have real impact in decreasing the NO_x emissions.

Reference:
https://www.jamstec.go.jp/e/about/press_release/20170127/

Government

- Ratify The Montreal Protocol
- Policy in controlling, registration and licensing system of using ODS
- Regulation
- Ban for import/ export ODS product
- Make emission regulations
- Make joint program with other international organization

Industry

- Operate on non-HCFC refrigerants
- Stop to use ODS in their product
- Substitute with non-ozone depleting substances
- Develop products with less N_2O emission

Student

- Identify ODS-using equipment and ODS in use
- Avoiding ozone-depleting products
- **Other????**

Scientist

- Finding non-ozone-depleting substitutes for ODS
- Create the less N_2O emission technology
- Advocating for ozone protection to local farms

Conclusion

Conclusion

- Ozone depletion will result in an increase of UV-B radiation reaching the Earth's surface
- Ozone depletion caused by man-made activity of using Ozone depletion substances and emission of nitrous oxide
- Ozone depletion affect to ecosystem and human health
- We are strongly recommend you take the real action to save ozone for better life in the future.

Discussion

- Why do we care about ozone depletion?
- As a student, what you can do to prevent ozone depletion?
- Will the ozone layer recover?

Particulate Matter (PM): its origin and composition, and effects on our health and environment
粒子状物質(PM): その起源と組成、健康と環境への影響

D1 Panyapon Pumkaeo
D1 Annisyia Zarina Putri
M1 Haruka Shimizu 清水 春佳
M1 Tetsu Kawakami 川上 哲

Outline

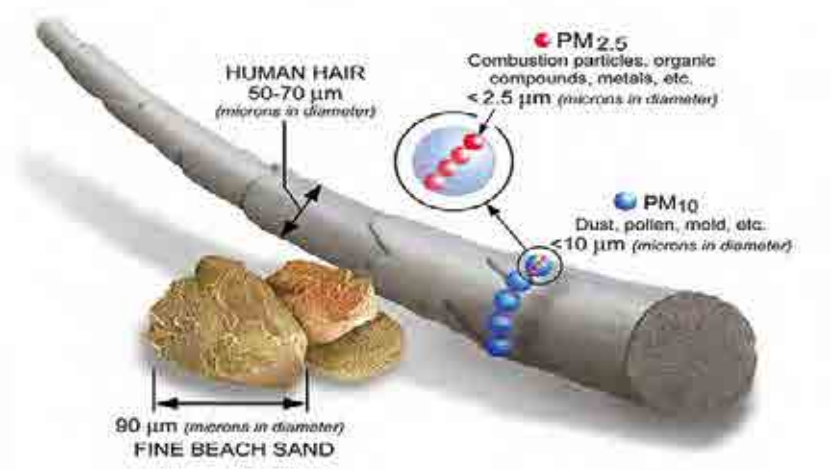
- Introduction of Particulate matter (PM)
- Health and environmental effects from PM
- Effects of PM in Asian countries
- Prevention from PM for our health
- Conclusions
- Discussion Topics

What is Particulate matter (PM) ?



- A mixture of particles found in the air, including dust, dirt, soot, smoke, liquid droplets. Some of them are so small that individually they can only be detected with an electron microscope (mold, spore, bacteria and pollen).
- These mixtures have different physical and chemical properties that are usually different by location.

Common PM Size



PM_{10}

all particles with aerodynamic diameter < 10 micrometer

most commonly measured size fraction

all particles with aerodynamic diameter < 2.5 micrometer

size fraction linked to various health impact

$PM_{2.5}$

http://urbanemissions.blogspot.com/2017/01/infographic-penetration-of-particulate.html

https://www.epa.gov/pm-pollution/particulate-matter-pm-basics

About PM 2.5 and PM10

PM is divided with size, because the size is the most important element when we think of health effect and behavior of PM in the atmosphere.

In the past time, scientists measured PM_{10} only because the limited equipment could not detect the smaller size. But nowadays, scientists are able to analyze smaller particulate matter $PM_{2.5}$, which is more dangerous to our health.

$PM_{2.5}$ (smaller than 2.5μm)

Man-made sources

More pollutants

More effects to human health

Stays in the air longer and spreads farther

PM_{10} (smaller than 10μm)

Natural sources

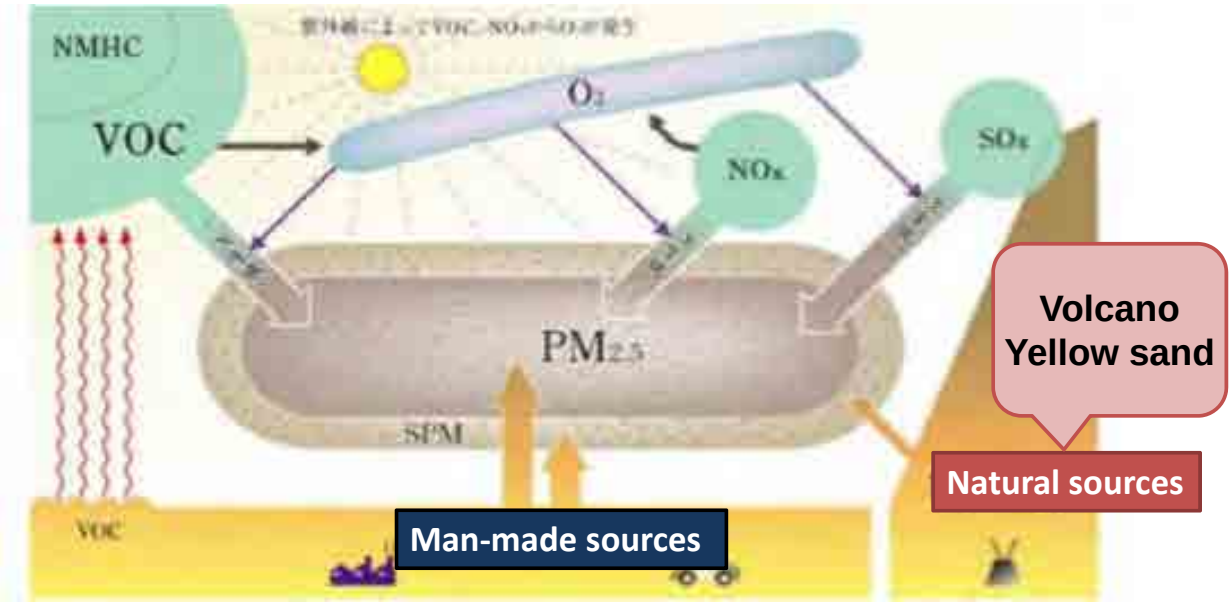
$PM_{2.5}$ is more dangerous than PM10, and it has more effects to our health

We mainly focus on PM2.5

The major composition of PM

There are 2 types of PM

- One is **Primary PM** which is directly emitted by human and natural activities
- The other one is **Secondary PM** which is produced by chemical reaction of ozone and sunlight with gases such as VOC, NOx, SOx and so on



Source: https://www.env.go.jp/policy/assess/5-4basic/basic_h23_6/mat_6_4_2.pdf

The major composition of PM

Most PM mass in urban and rural areas is composed of a combination of the following chemical components.

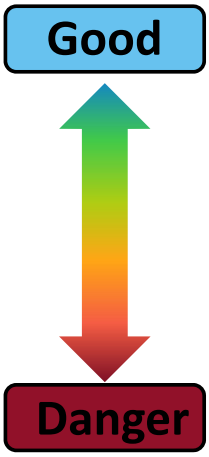
- **Geological Material** suspended dust consists mainly of oxides of Al, Si, Ca, Ti, Fe, and other metal oxides
- **Ammonium** – ammonium bisulfate, sulfate, and nitrate are most common
- **Sulfate** – results from conversion of SO2 gas to sulfate-containing particles
- **Nitrate** – results from a reversible gas/particle equilibrium between ammonia (NH3), nitric acid (HNO3), and particulate ammonium nitrate
- **NaCl** salt is found in PM near sea coasts and after de-icing materials are applied
- **Organic Carbon (OC)** – consists of hundreds of separate compounds containing mainly carbon, hydrogen, and oxygen
- **Elemental Carbon (EC)** – composed of carbon without much hydrocarbon or oxygen. EC is black, often called soot.
- **Liquid Material** – soluble nitrates, sulfates, ammonium, sodium, other inorganic ions, and some organic material absorb water vapor from the atmosphere

Chow and Watson (1997)

Air Quality Guidelines and Interim targets for PM2.5 and PM10

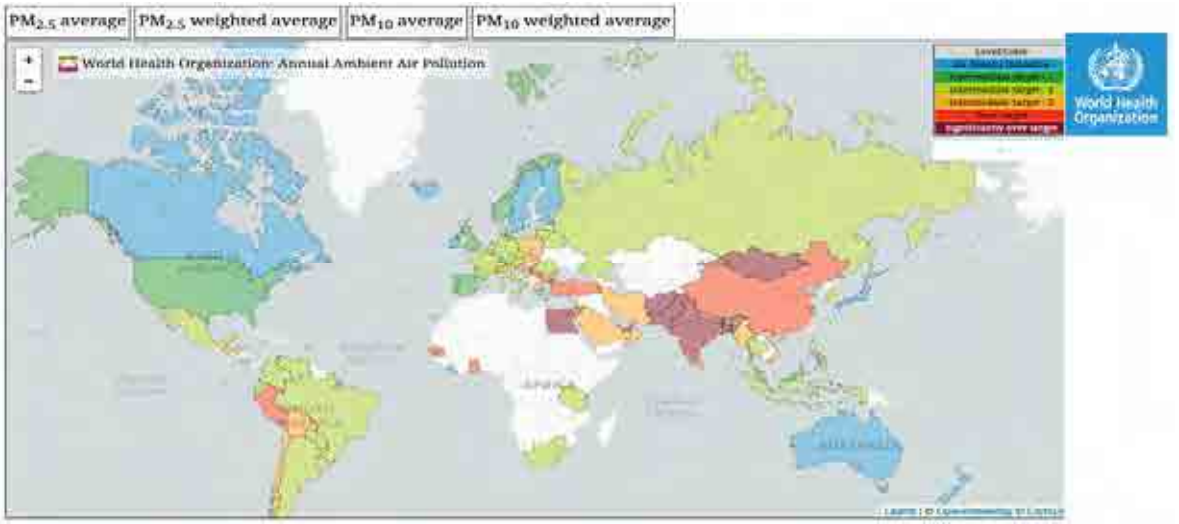
World Health Organization

Level	$PM_{2.5}$	PM_{10}
Air Quality Guideline	0 .. 10	0 .. 20
Intermediate target - 1	10 .. 15	20 .. 30
Intermediate target - 2	15 .. 25	30 .. 50
Intermediate target - 3	25 .. 35	50 .. 70
Over target	35 .. 53	70 .. 105
Significantly over target	53 .. ∞	105 .. ∞



http://aqicn.org/faq/2015-05-16/world-health-organization-2014-air-pollution-ranking/

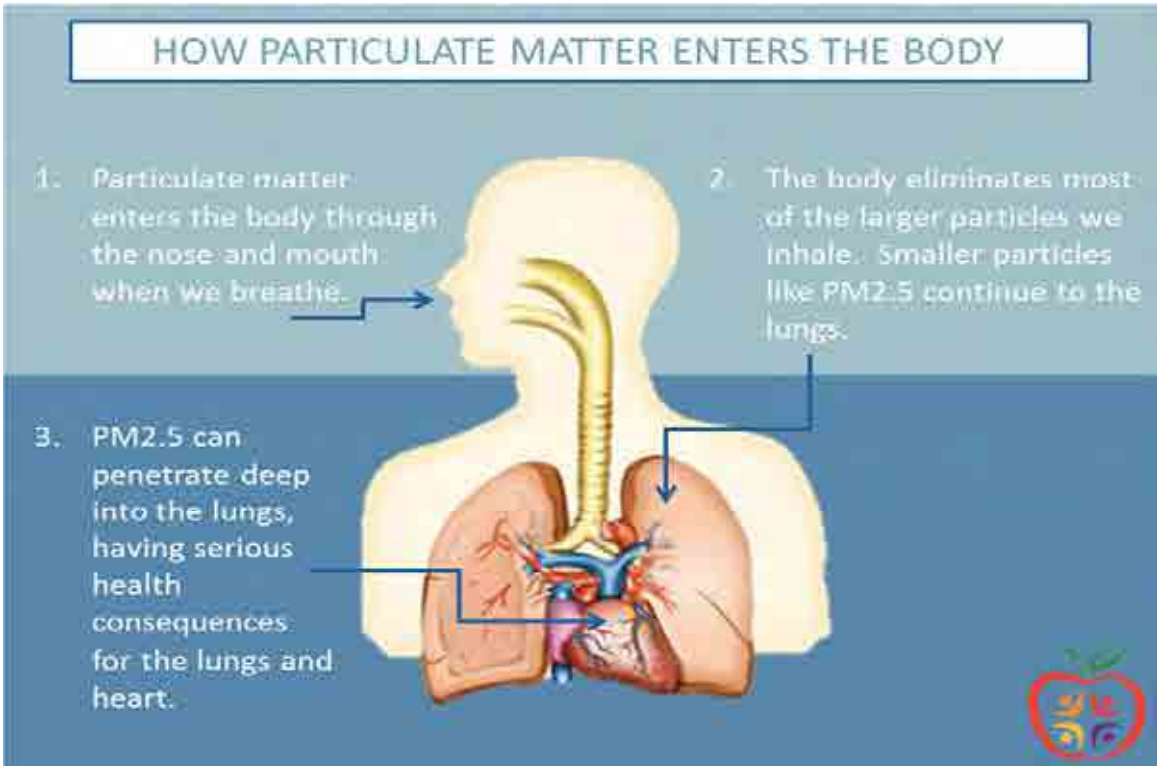
World Health Organization: Annual Ambient Air Pollution



- According to World Health Organization (WHO) more 90 percent of the population lives in places with higher pollution than what's considered healthy.
- As estimated by Ecology Global Network some 55 million die every year worldwide. And again WHO estimates that 4.6 million people die each year from causes directly attributable to air pollution.
- In Iran around 33,000 people die each year because they are exposed to unhealthy environment. In Tehran, the capital which suffers the most from air pollution, some 4,810 deaths occurred in 2016 are attributed to air pollution.

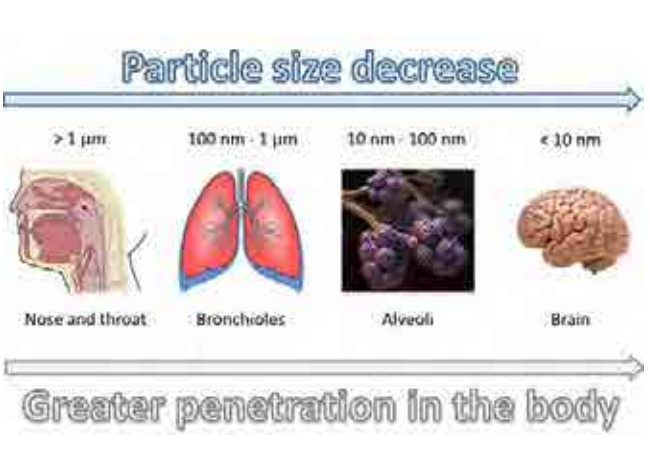
http://aqicn.org/faq/2015-05-16/world-health-organization-2014-air-pollution-ranking/

Health effects of PM



http://www.health.utah.gov/utahair/pollutants/PM/

Health effects of PM



- The particles having a size greater than 1 micron are easily intercepted and deposited in the nose and throat
- Between 100 nm and 1 micron can reach up to the bronchioles
- Smaller size (10nm-100nm) , the situation becomes more problematic, since the particles are not retained by the nasal or bronchial mucosa and can penetrate to the alveoli
- The hyperfine particles (<10 nm), it could emerge at the neuronal level of problems. Particles might make their way to the brain and damage it directly, or they might attack it from a distance, by triggering the release of inflammatory molecules

https://www.tecnosida.com/4133/ultra-fine-dust-origin-and-effects-on-health-and-environment

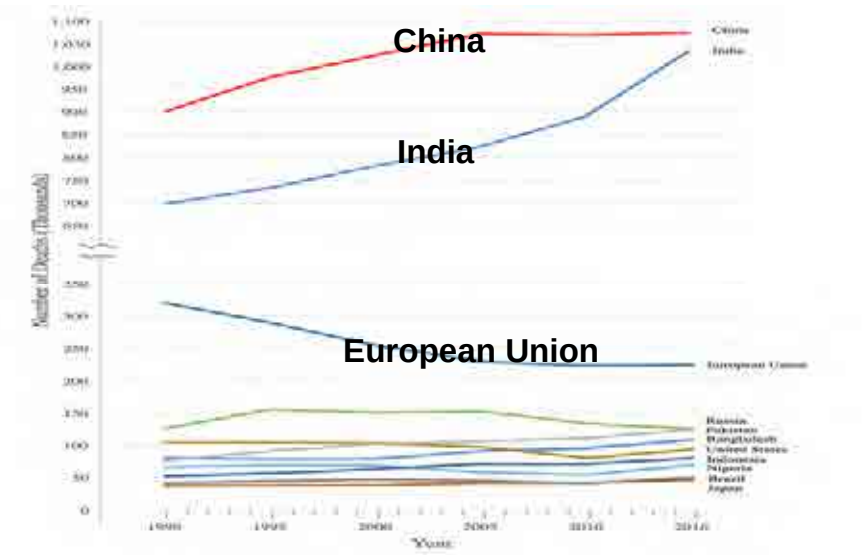
Health effects of PM

Certain Groups Are Most at Risk from Exposure to Particle Matter

- Children
  - Lungs are still developing
  - Spend more time at high activity levels
- Senior citizens
  - May have undiagnosed heart or lung diseases
- People with existing heart or lung diseases
  - Particle pollution aggravates these diseases
- People who exercise or work outdoors
  - Breathe faster and deeper than sedentary adults

Health effects of PM

- Number of deaths attributable to ambient $PM_{2.5}$ in the 10 most populous countries and the European Union



Trends in global health linked to fine particulate matter

Globally, deaths that can be linked to breathing ambient (outdoor) fine particulate matter ($PM_{2.5}$) increased from about 3.3 million in 1990 to 4.1 million in 2016.

[Figure J, © HEI]

Environmental effects of PM

Visibility impairment

Fine particles (PM2.5) are the main cause of reduced visibility (haze) in parts of the United States, including many of our treasured national parks and wilderness areas

https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm

Environmental effects of PM

- Depleting nutrients in soil
- Damaging forests and farm crops
- Affecting diversity of ecosystems

- Making lakes and streams acidic
- Contributing to acid rain effect

Causes deaths of fish and other creatures that live in the area

PM in Japan

Particular Matter (PM)

PM

Source

NOx, SOx

Yellow Sand

PM2.5

Pollen

etc..

Yellow Sand

Pollen

Exhaust gas

PM in Japan

Particular Matter (PM)

PM

Source

NOx, SOx

Yellow Sand

PM2.5

Pollen

etc..

Yellow Sand

Pollen

Exhaust gas

PM in Japan

History of PM

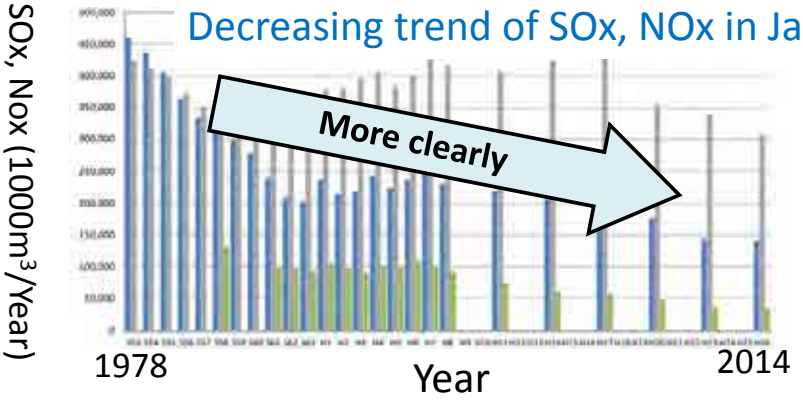
From 1960

Kitakyushu Yokkaichi

From 2018

Kitakyushu Yokkaichi

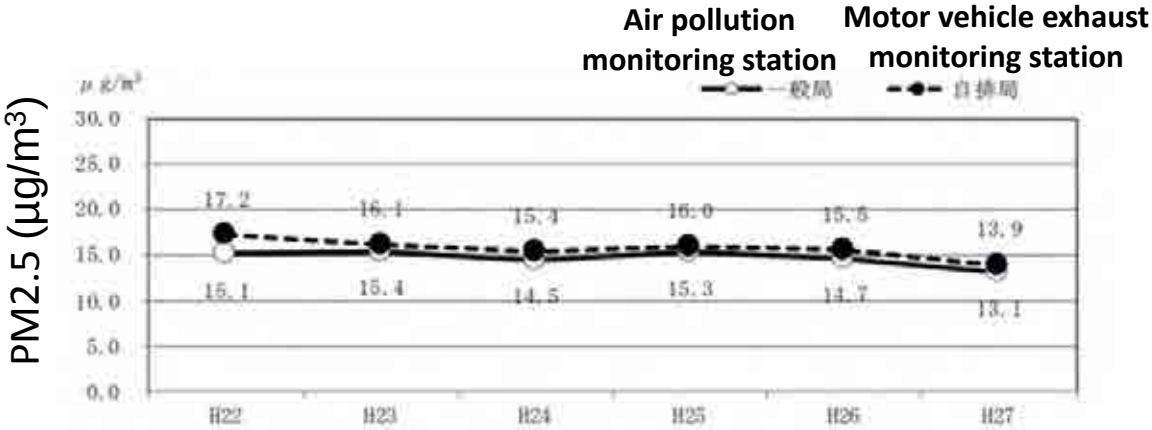
Decreasing trend of SOx, NOx in Japan



PM in Japan

Standard of PM2.5

- EU 25 (μg/m³・year)
- Japan 15 (μg/m³・year)
- China 35 (μg/m³・year)
- USA 12 (μg/m³・year)



http://www.env.go.jp/air/osen/jokyo_h27/full_h27.pdf

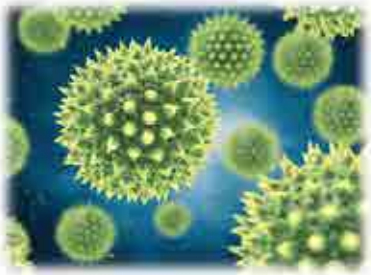
PM in Japan

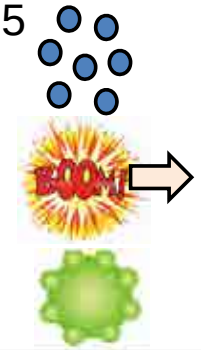
Pollen

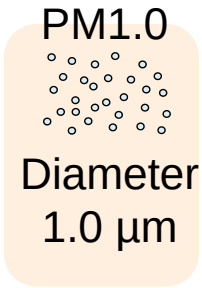
E.X) Sugi, Hinoki etc...

Itching throat and eye

Pollen + PM2.5



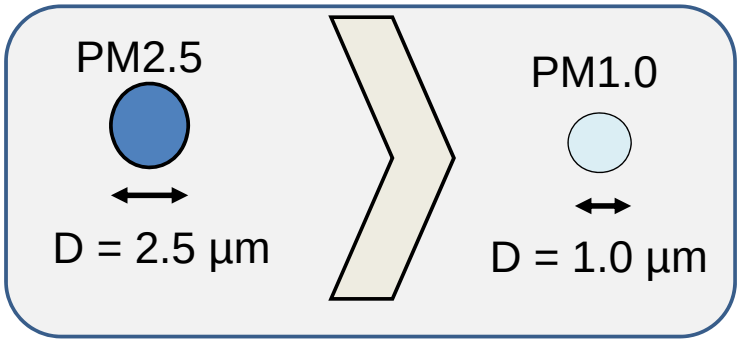




PM in Japan

PM1.0 effect on Health

Pollenosis

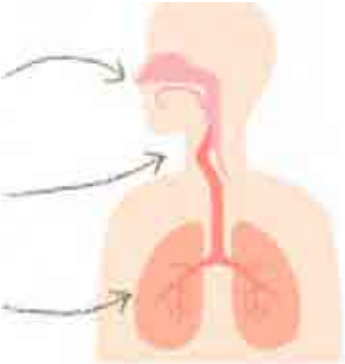


Pollenosis
+
Cough
+
Asthma

Muzzle・Throat
4.7 μm～11 μm

Bronchus
2.1 μm～4.7 μm

Air vesicle
less than 2.1 μm



http://www.st-c.co.jp/plus/channel/2015_06.html

PM in Indonesia

Jakarta Remains In Top 5 Of World's Worst Air Quality Index

- Based on a real-time air quality index uploaded to the Airvisual website for a recent survey, Jakarta ranks fourth most polluted city in the world; below only Dhaka, Karachi and Ulaanbaatar.
- Jakarta already has notoriously bad air quality, caused mainly by transport and residential emissions.

http://indonesiaexpat.biz/news/jakarta-remains-top-5-worlds-worst-air-quality-index/

https://www.gettyimages.ca/event/jakartas-air-pollution-third-worst-in-the-world

PM in Indonesia

- The difference in air condition in Jakarta before and after people returning to their hometown. Air became more clean because pollution from transport decreased
- New danger, which threatens to make the situation much worse. A wave of massive coal-fired power plants - a total of seven large units - is being planned within 100 km of Greater Jakarta

https://news.detik.com/berita/d-3544174/viral-begini-beda-langit-jakarta-sebelum-dan-saat-lebaran

http://m.greenpeace.org/seasia/PageFiles/

PM in Indonesia

In September-October 2015,
an enormous fires broke out in Sumatra and Borneo

Fires mainly occurred in Indonesia and persisted for about 6 weeks

Reasons for burning in Indonesia:

- Clear tropical forests to make way for palm oil or timber plantation
- Clear residue after harvest on small farms

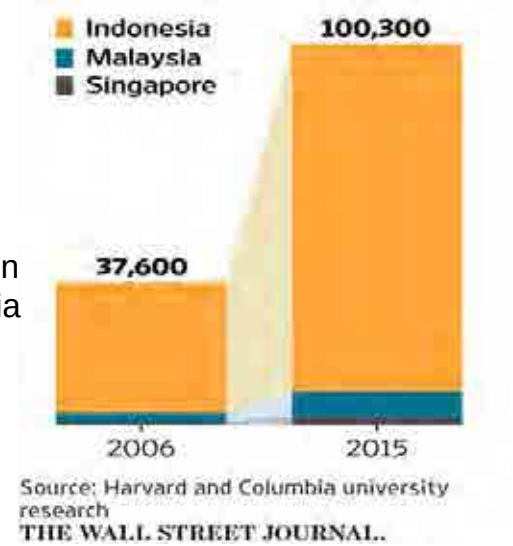
PM in Indonesia

Effect from fires in Sumatera

Haze Hazard

Smoke from fires set in Indonesia has been liked to premature deaths in Southeast Asia

Estimated early deaths from carbon-based particulate matter



- The number of smoke-related “excess deaths” from July 2015 through October at 100,300 mostly in Indonesia, but also in Singapore and Malaysia
- In 2015 , 72% of the fire activity on the island was on peatlands, up from 44% in 2006.

PM in Indonesia

How people in Indonesia deal with PM

- Recently, people in Jakarta already wear mask everyday if going outside

https://www.cnnindonesia.com/nasional/20180517145138-20-298981/udara-jakarta-terkotor-di-dunia-sandiaga-cuma-bikin-imbauan

- If the Jakarta`s air quality get worse soon then Jakarta should find the other source of clean air. For example carry the bag of oxygen

http://m.greenpeace.org/seasia/PageFiles/

PM in Thailand

February, 2018

According to an air pollution report at http://aqicn.org, the PM2.5 level in **Bangkok** reached peaked at 203 micrograms at around 7am, a level considered “very unhealthy” and leading to calls for children, adults, and people with respiratory disease to avoid all outdoor exertion.

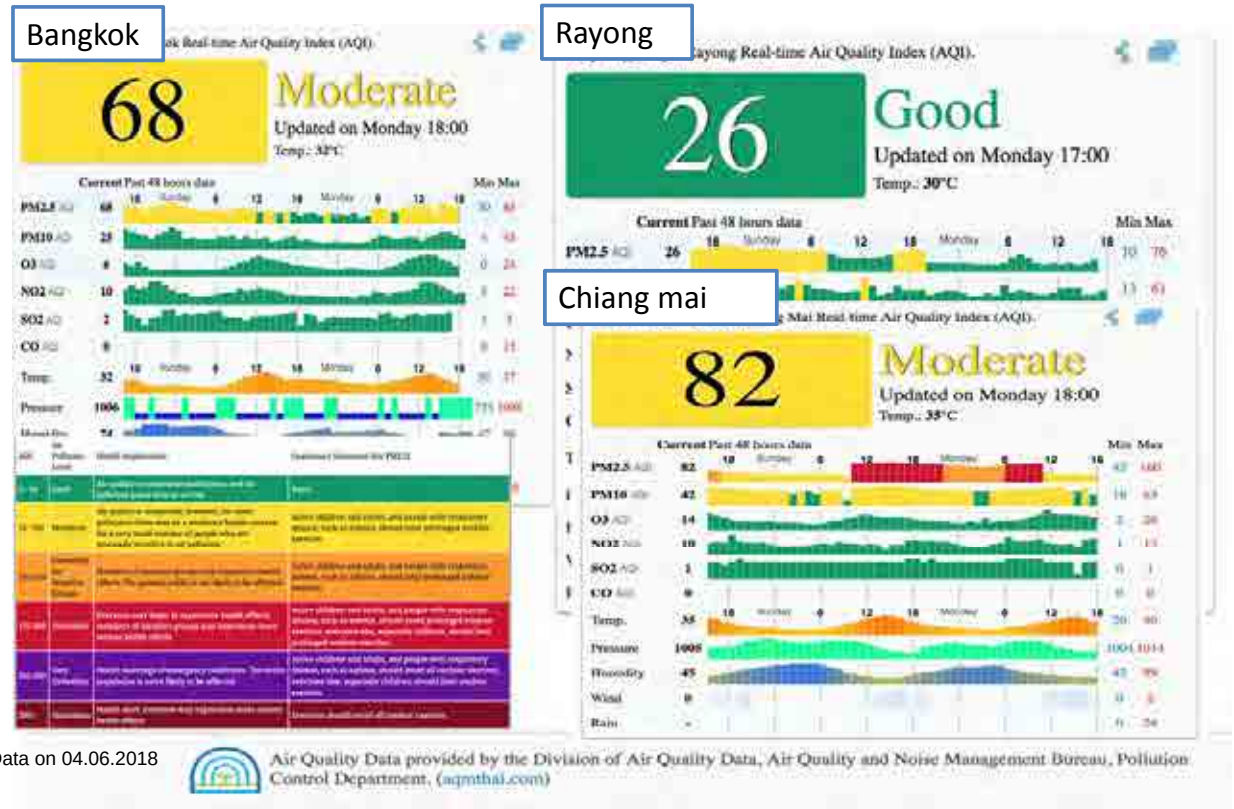
Greenpeace’s City Rankings for PM2.5 in Thailand

PM in Thailand

Bangkok

Rayong

Chiang mai



Data on 04.06.2018

Air Quality Data provided by the Division of Air Quality Data, Air Quality and Noise Management Bureau, Pollution Control Department. (aqmthai.com)

PM in Thailand

Thailand's Weak Emission Standards

		PM2.5 (µg/m3)	PM10 (µg/m3)
Thailand	Annual mean	25	50
	24-hour mean	50	120
WHO	Annual mean	10	20
	24-hour mean	25	50

Thailand's national air quality standards are weak compared to the World Health Organization's (WHO) recommendations.

PM in Thailand

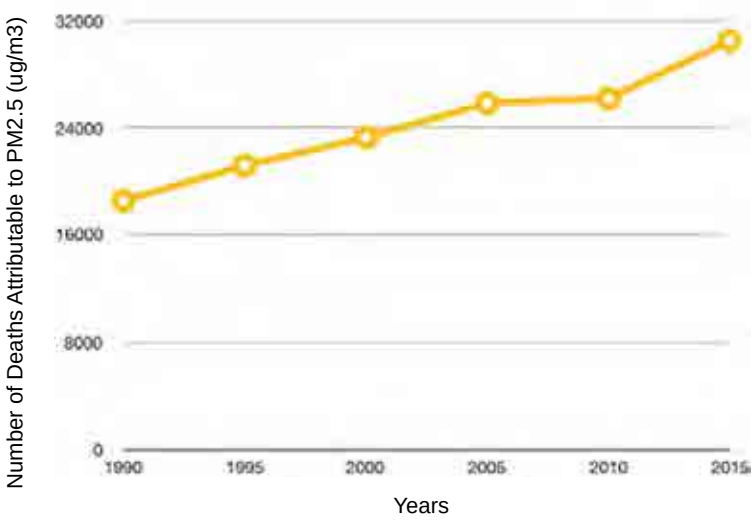
Major Sources of PM2.5 in Thailand

Sources	PM2.5 (tons/year)
Transportation	50,240
Electricity Generation	31,793
Manufacturing Industries	65,140
Household/Businesses	28,265
Open Burning	209,937

Estimated emissions (tons/year) from different sources contributing to air pollution (Source: Pollution Control Department, and Ministry of Energy)

PM in Thailand

PM 2.5: cause of premature death in Thailand



A recent analysis of the State of Global Air website at https://www.stateofglobalair.org/ showed that PM2.5 causes premature death of approximately 30,500 in Thailand, 2015.

Prevention from PM for our health

- Use certain filters and room air cleaners to reduce indoor PM level
- Check the Real-time World Air quality Index website to know PM level in your area
- Keep the car, boat, and other engines well-tuned, and avoid using engines that smoke
- Reduce your activity time or substitute another that involves less exertion (e.g. Go for a walk instead of a jog)
- Plan outdoor activities for days when particle levels are lower
- Don’t exercise near busy roads where particle levels generally are higher

Conclusions

- Particulate matter (PM) is a general term for very small solid and liquid particles in the atmosphere.
- There are many different sources of PM, including natural and anthropogenic (man-made) sources.
- PM is hazardous to human (e.g. Heart and lung diseases).
- PM also causes variety of environmental effects, such as visibility impairment, and environmental damages (e.g. lakes and streams acidic, depleting the nutrients in soil, acid rain effects).

Discussion Topics

- What is the biggest cause of PM in your country ?
- Do you have any idea how to reduce PM in your country?

Joint Seminar
2018/11/02
@302

Population Ageing in Asian Countries

Chatani Issei (M2)
Erda Rahmilaila Desfitri (D1)
Wang Fenglan (D2)

Outline

1. Definition of population ageing
2. Causes and problems of population ageing
3. Ageing progress and population pyramid in Asia
4. Concreate examples : Japan, China and Indonesia
   a. Present condition
   b. Causes of population ageing
   c. Effects of population ageing
   d. Measurements against population ageing
5. Conclusion
6. Discussion

1.Definition of population ageing

- The increase of the share of old individuals in a society due to fertility decrease and rising life expectancy.
- Population ageing (also known as demographic ageing and ageing of population) is often measured by increase in the percentage of elderly people of retirement ages. The retirement ages may vary by country but a typical cutoff is 65 years.

https://www.brookings.edu/blog/up-front/2016/05/02/two-solutions-to-the-challenges-of-population-aging/

Leonid A. Gavrilov and Patrick Heuveline (2003) Ageing of population: The Encyclopedia of Population

2. Causes and Problems of Population Ageing

a. Causes of population ageing

Population ageing is driven by:

a) Declines in fertility and birth rate
   - ✓ Women's participation in society
   - ✓ Lack of nursery facilities
   - ✓ Financial affairs

b) Increasing in life expectancy
   - ✓ Improvement in health
   - ✓ Good diet and improved water supply

2. Causes and Problems of Population Ageing

b. Problems of population ageing

a. Social aspect
- ✓ More support services is needed.
- ✓ Fewer workforce.

b. Economic aspect
- ✓ Slow economic activity.
- ✓ Reduced taxation income for the government.
- ✓ More retired people increase pension cost.
- ✓ Increasing poverty in older population.
- ✓ Potential of slower economic growth for a long-term.

3. Ageing progress in Asia

According to WHO (World Health Organization),

- Society's ageing rate: the proportion of elderly people aged 65 or over 65 in the total population
- Ageing society: Society's ageing rate exceeds 7%

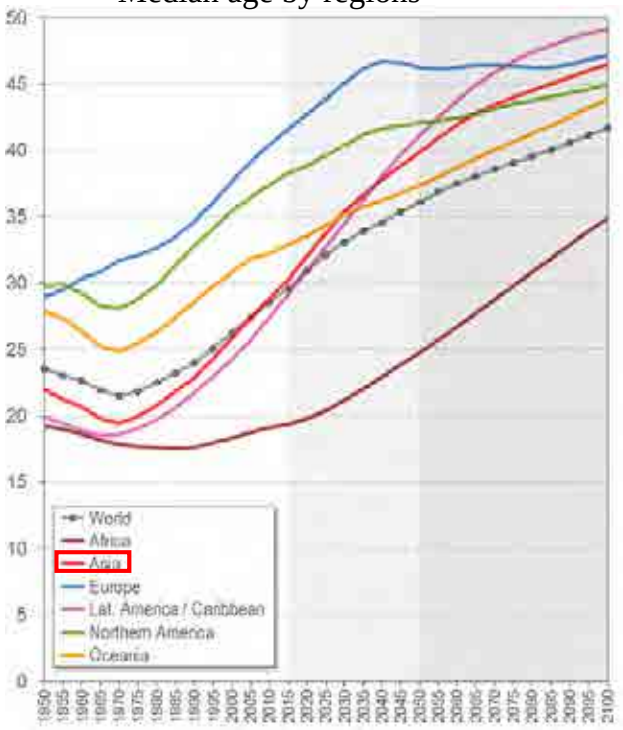
Society's ageing rate	Name of the society
>=7%	Ageing society
>=14%	Aged society
>=21%	Super-aged society

◆Ageing society: Thailand (10), China (9.4)
◆Aged society: Korea (13.9), Singapore (about 15)
◆Super-aged society: Japan (26)

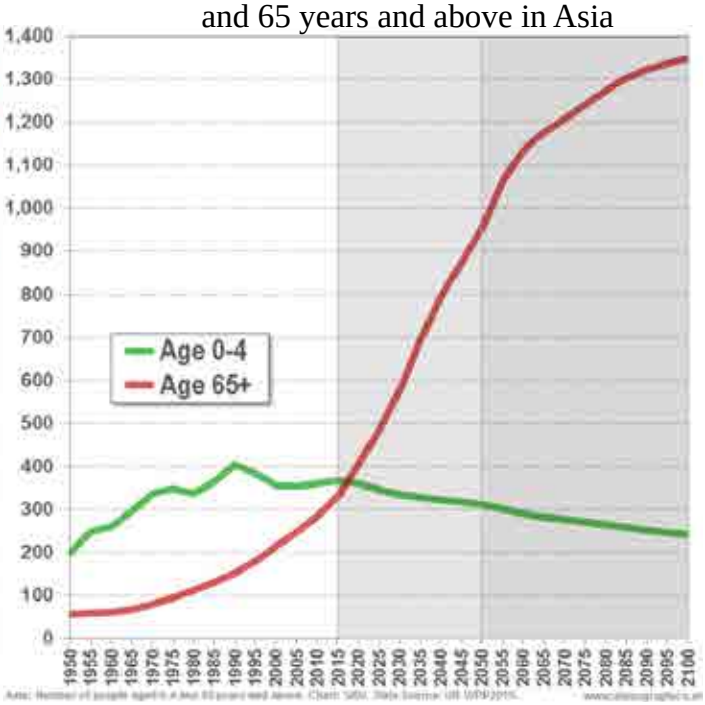
3. Ageing progress in Asia

People under 4 years old is decreasing year by year, contrarily people 65 years old or more is increasing year by year.

Median age by regions

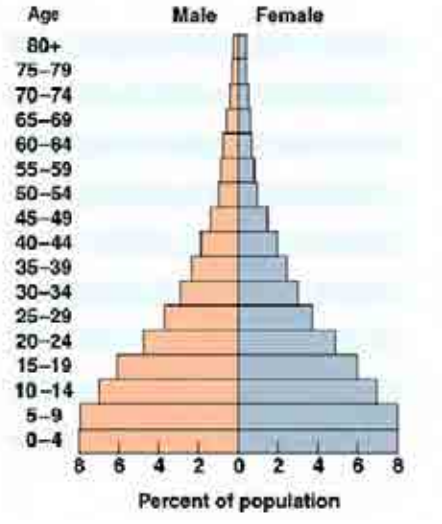


Number of people aged 0-4 and 65 years and above in Asia



What kind of population pyramid?

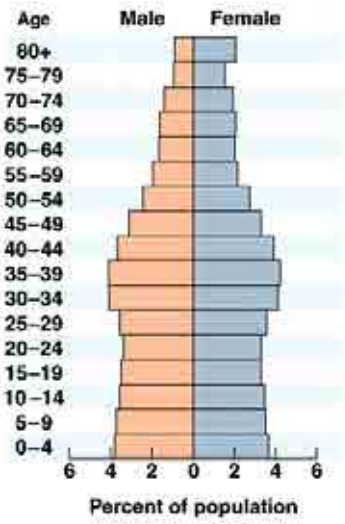
①Expansive type



Patterns of economically developing countries

- High birth rate
- High death rate
- Short life expectancy

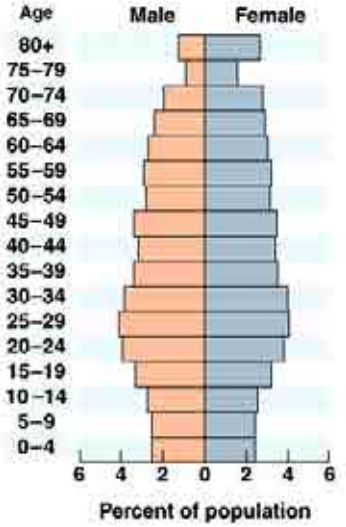
②Stationary type



Patterns of a little developed countries

- High birth rate
- Low death rate
- Long life expectancy

③Constrictive type

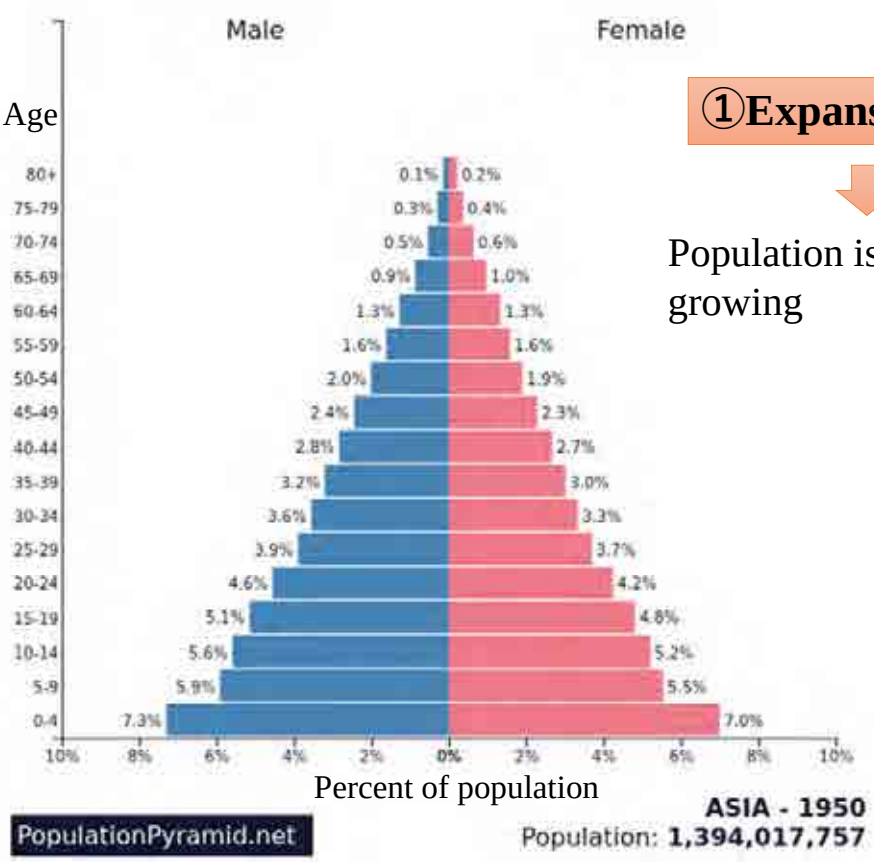


Patterns of developed countries

- Low birth rate
- Low death rate
- Long life expectancy

https://populationeducation.org/what-are-different-types-population-pyramids/

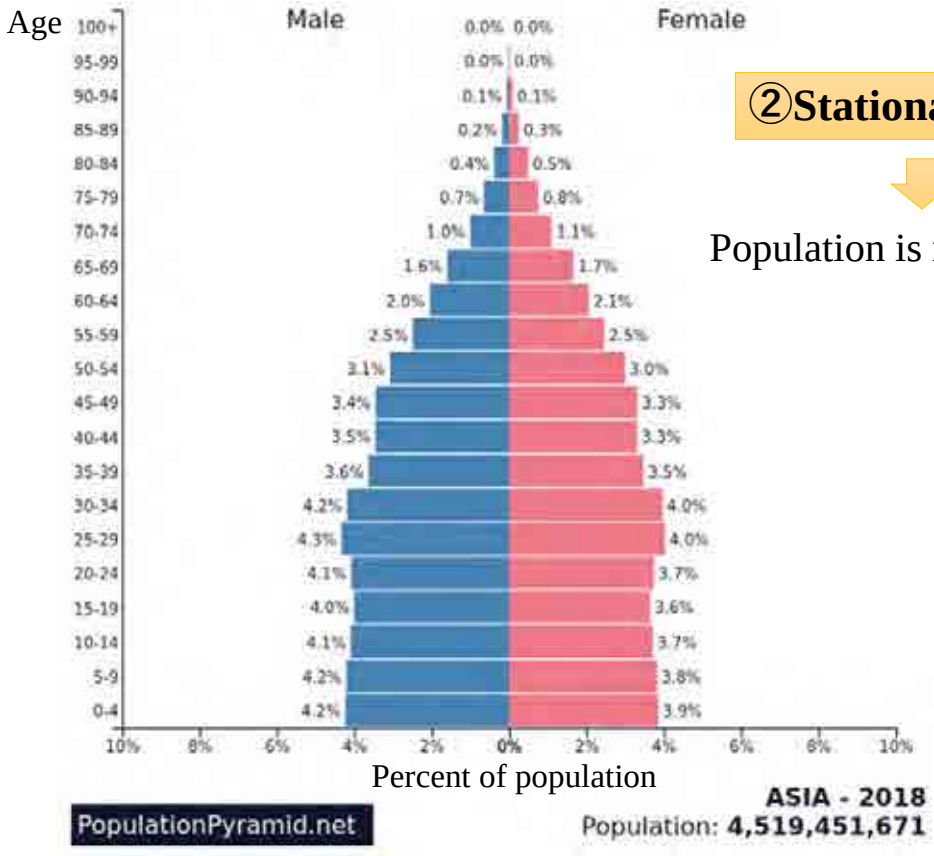
Population pyramid in Asia (1950)



①Expansive type

Population is young and growing

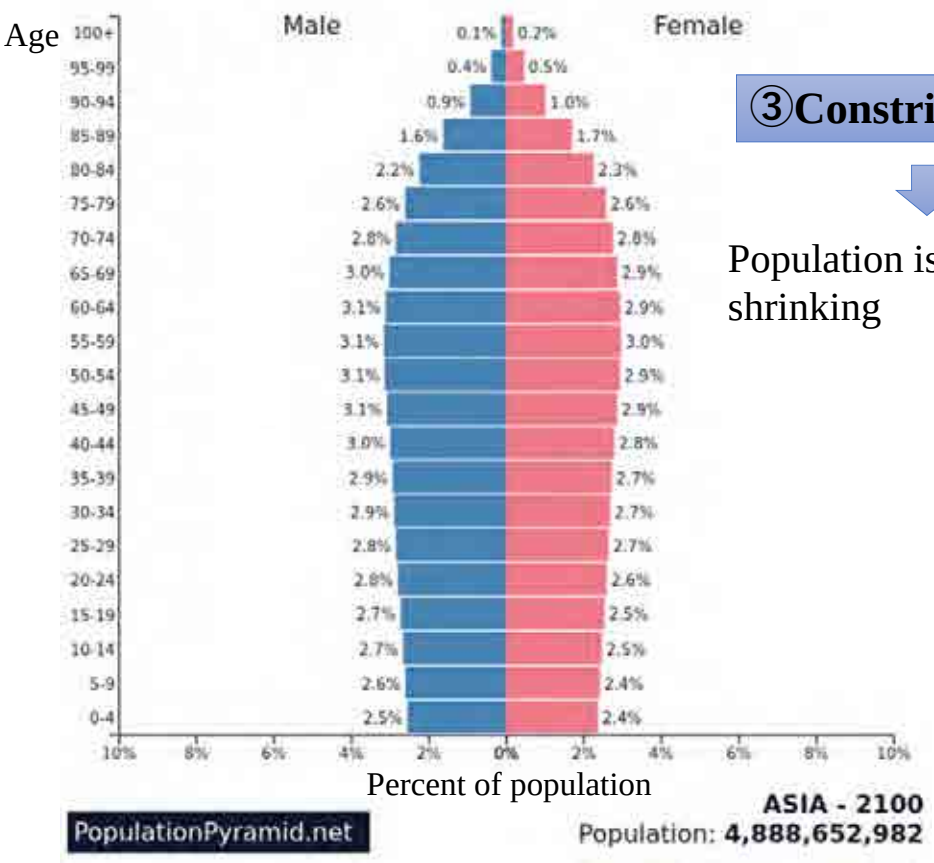
Population pyramid in Asia (2018)



②Stationary type

Population is not growing

Population pyramid in Asia (2100)



③Constrictive type

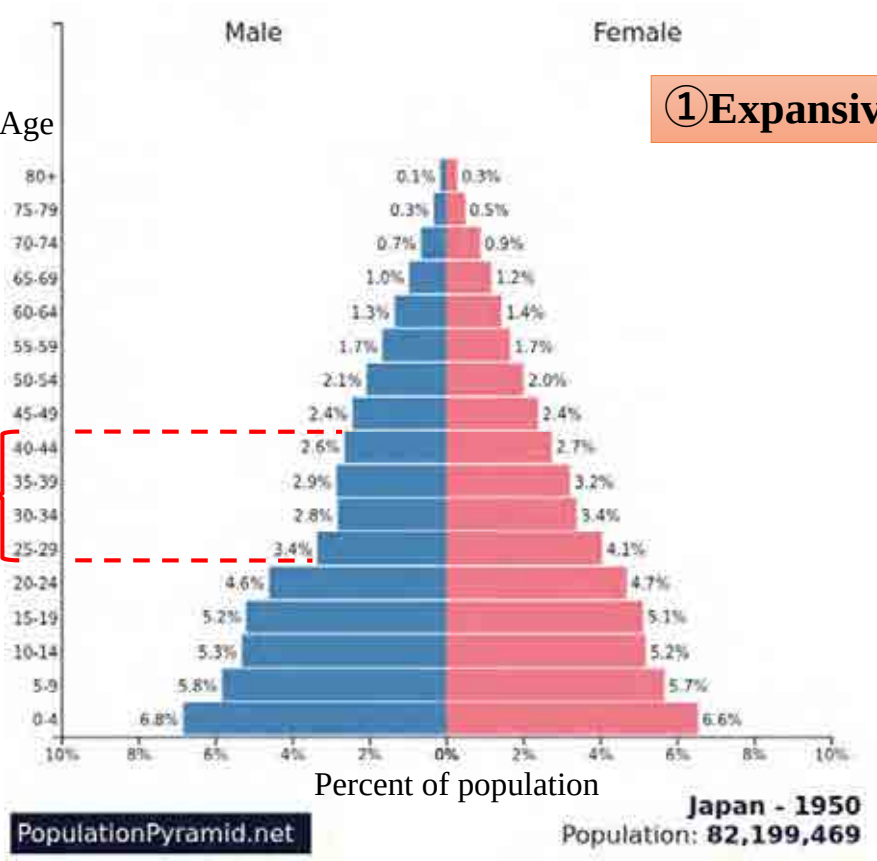
Population is elderly and shrinking

Concreate examples: Japan

https://otakaranet.com/nihontizu.html

http://dol.ismcdn.jp/mwimgs/4/c/670m/img_4c8aee460670d1113cf84765401c3111144652.jpg

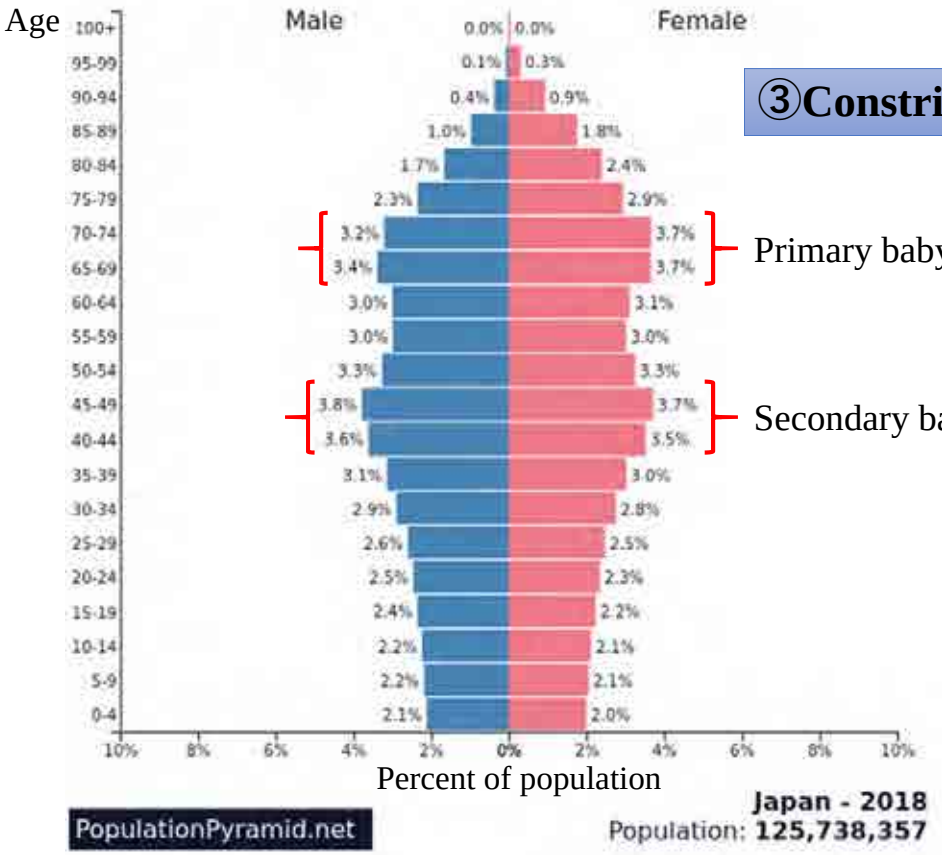
Past condition in Japan (1950)



①Expansive type

Dispatch of troops because of World War Ⅱ

Present condition in Japan (2018)

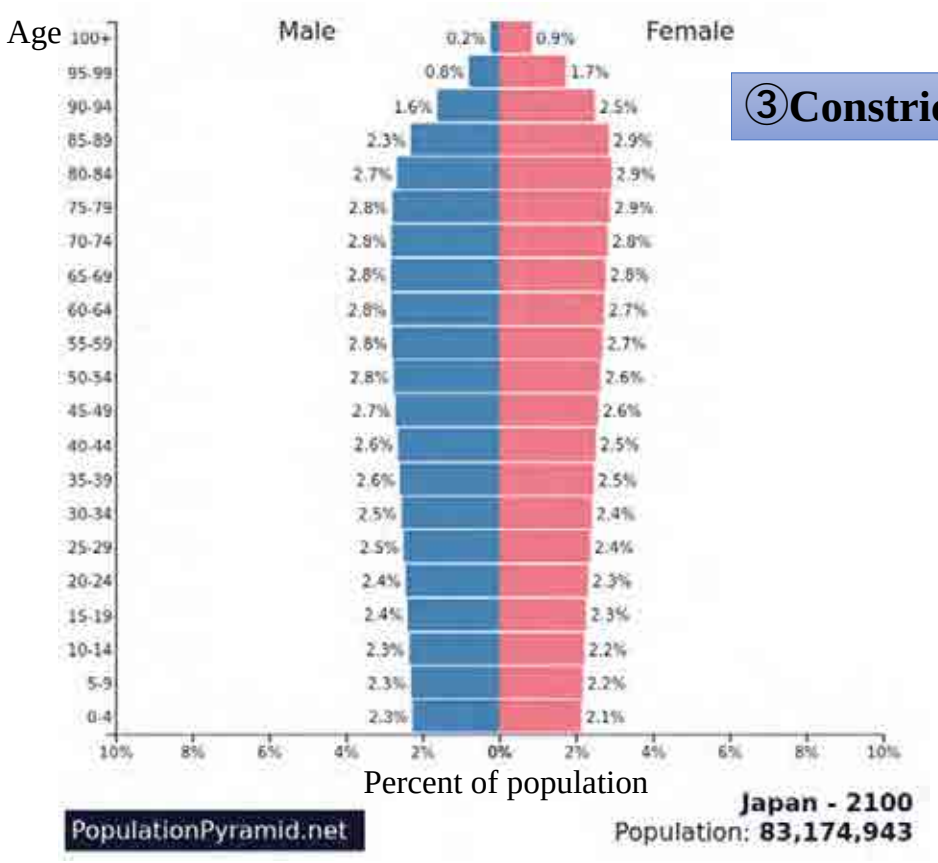


③Constrictive type

Primary baby boom

Secondary baby boom

Future condition in Japan (2100)



③Constrictive type

Present condition in Japan

- Major reasons for Japan's famous longevity is modern medicine and eating habits.
- The national diet features little fat but plenty of fish, tofu, natto, miso, and other soy products.

Life expectancy			
Male	Female	Average	World Rank
81.1	87.1	84.2	1

tofu

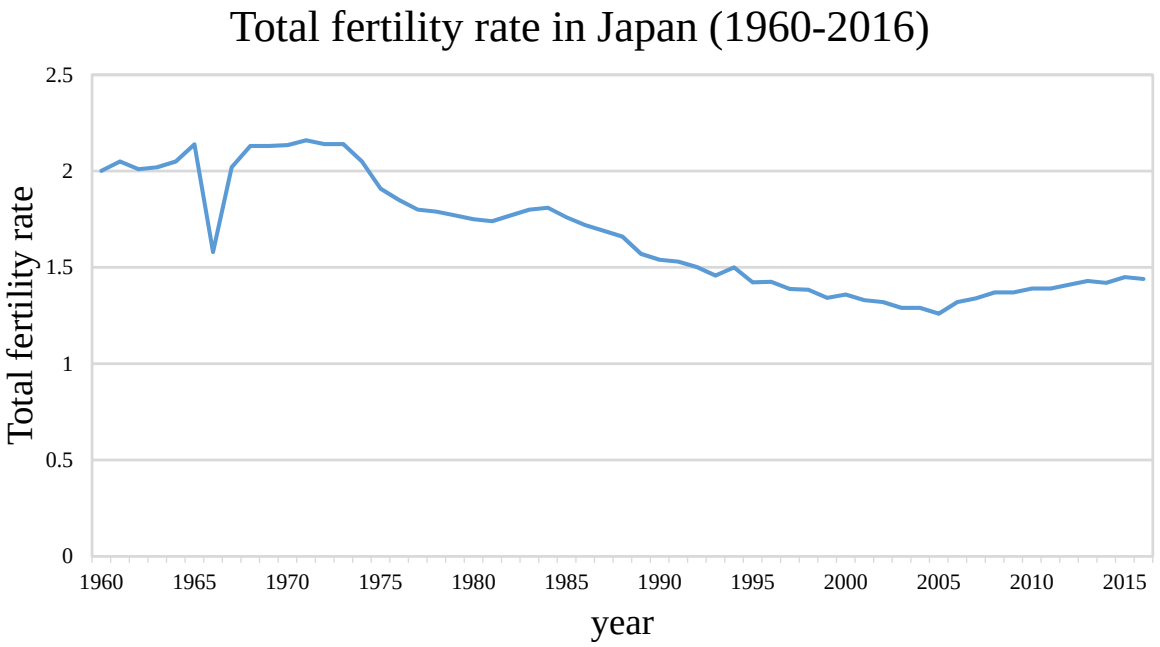
https://erecipe.woman.excite.co.jp/article/E1471246114113/

natto

https://www.mag2.com/p/news/256772

https://www.worldlifeexpectancy.com/japan-life-expectancy

Present condition in Japan



- ✓ Total fertility rate decreases compared with the past.
- ✓ But it has a little recovered since 2005.

https://data.worldbank.org/indicator/SP.DYN.TFRT.IN?locations=JP

Causes of population ageing in Japan

https://www.irasutoya.com/2013/07/blog-post_6271.html

◆Declines in fertility and birth rate

- ➢Many choose not to marry
- ➢Women tend to marry later
- ➢Lack of child care facilities
  (Few women would return to work; They must care for children)

◆Increasing in life expectancy

http://www.gh.opho.jp/medical/1/

- ➢Advance in medical science and technology
  (medical instrument, medicine)
- ➢Result of baby boom from around 1945
  Many child were born just after World War Ⅱ
  ⇒Government needed labor force for Japanese reconstruction

Problems of population ageing in Japan

- ◆Decreased rate of economic growth
  - ➢Reduce working population→Difficulties in filling jobs
- ◆Larger tax bills
  - ➢Increase pension, medical expenses and nursing care insurance expenses
- ◆Increase careless traffic accidents
  - ➢Elderly people tend to make mistakes in driving car

http://www.keishicho.metro.tokyo.jp/kotsu/jikoboshi/koreisha/koreijiko.html

Measures against population ageing

- ◆Increase retirement age
  - ➢Japan can keep labor force by elderly people's work
- ◆Reforms
  - ➢Increasing benefits of having more child, providing tax allowances for families, making child care more accessible
- ◆Encourage immigration
  - ➢To solve labor shortages

https://4.bp.blogspot.com/-qKN4mN1C60w/VkLHUEzxqfI/AAAAAAAA0U4/ZTROn0ydo6w/s800/friends_kids.png

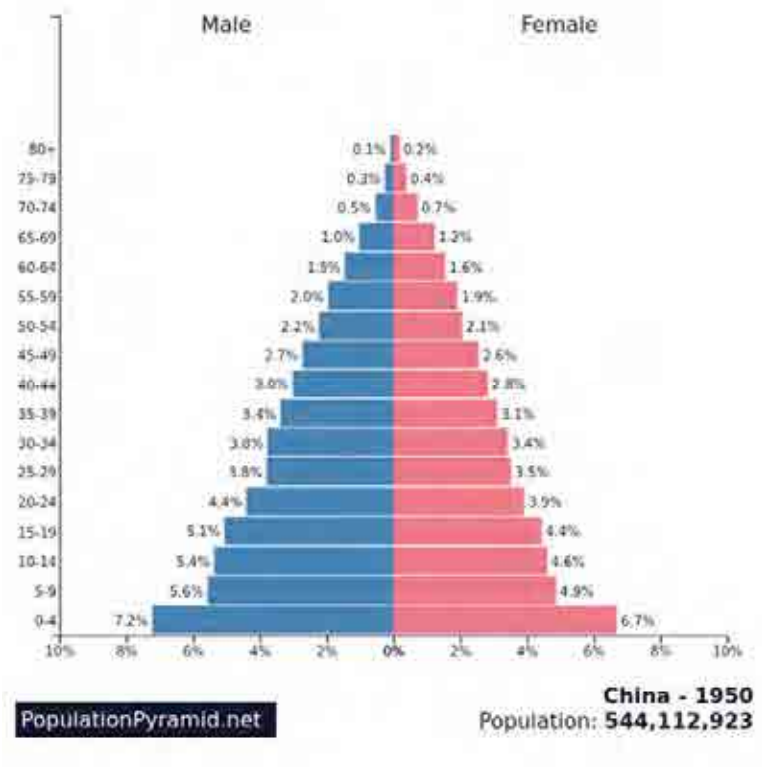
https://seniorguide.jp/article/1001630.html

Concreate examples: China

https://www.abysse.co.jp/world/flag/asia/china.html

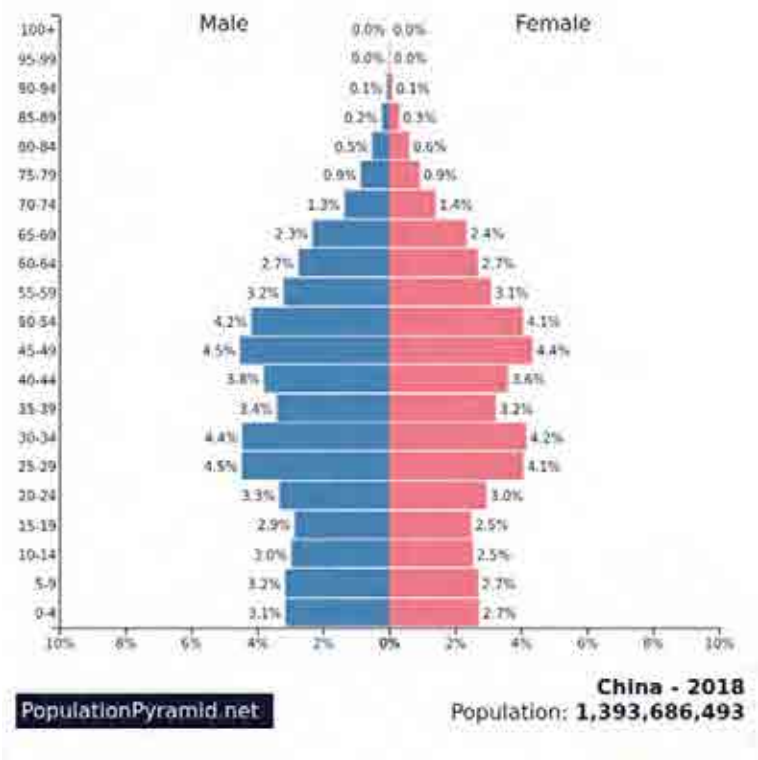
https://www.recordchina.co.jp/b144830-s0-c30-d0054.html

Past condition in China



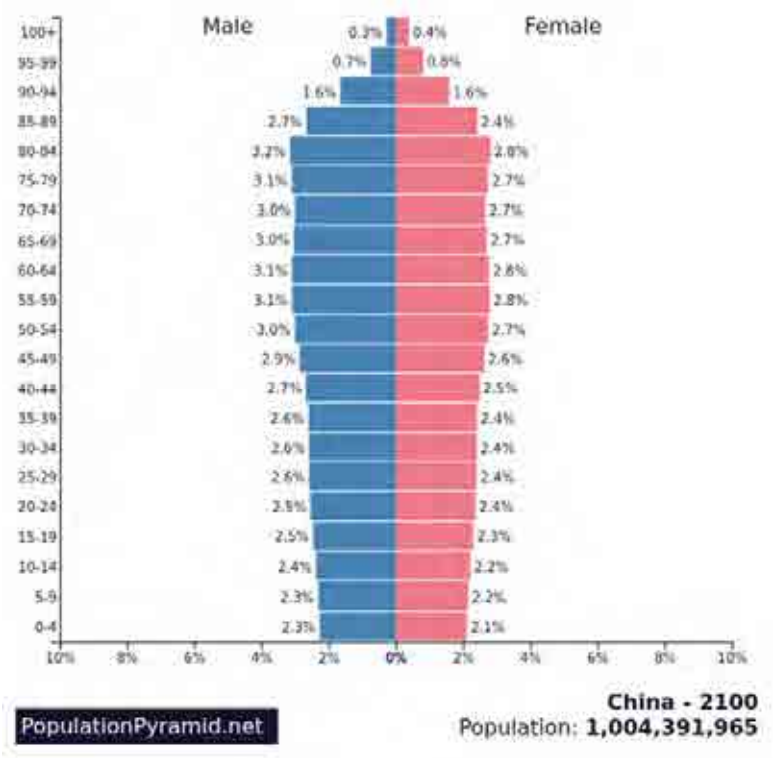
Expansive type

Present condition in China



Stationary type

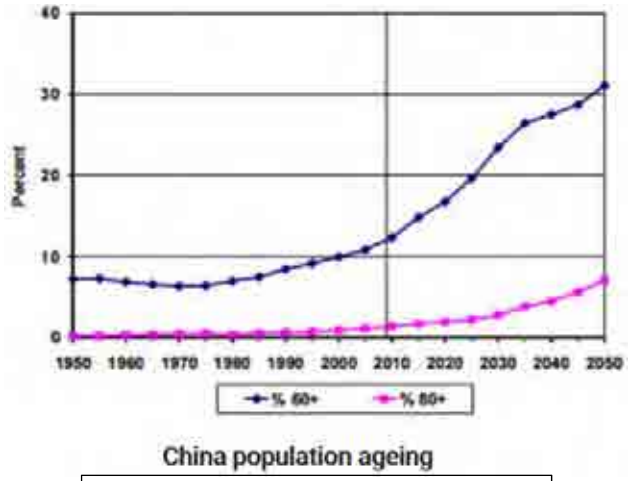
Future condition in China



Constrictive type

Present condition in China

Speed of population ageing is fast



China population ageing

Source: The International Silver Economy Portal

- There are currently 194 million people aged above 60 in China and this number is predicted to increase to 440 million by 2050.
- The average annual growth rate of the world elderly population is 2.5%, but compared to this, the increase rate in China is 3.3% from 1999 to 2020 according to the prediction of the United Nations.
- The elderly person population increase by 8,600,000 every year.

http://www.silvereco.org/en/statistics/

Present condition in China

Being an ageing society before becoming an advanced country

http://news.k618.cn/xdx/201209/t20120923_2432792.html

➢For developed country, they entered the ageing society when GDP per person exceeded 5,000~10,000 dollars.

➢In 2001, China entered the ageing society.

GDP(Gross Domestic Product) for per person,

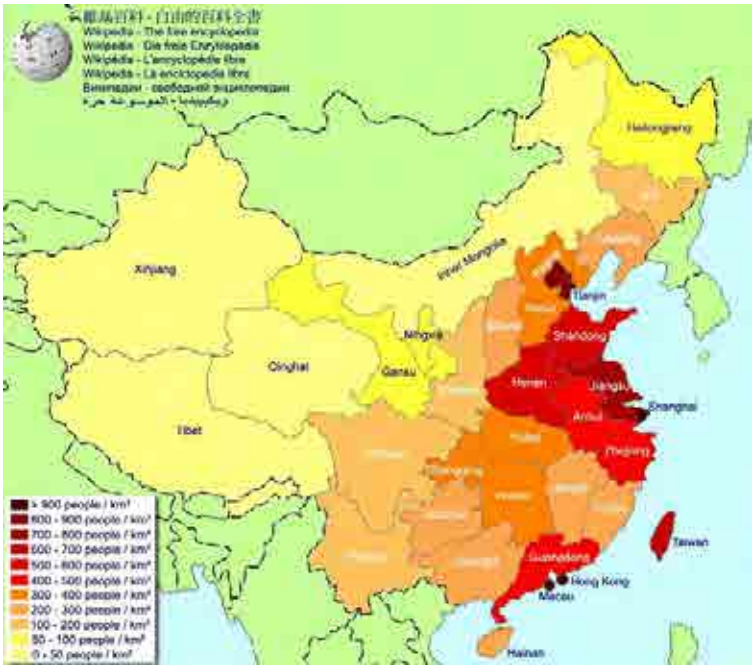
✓ In 2001 is 912 US dollars (7,543 RMB)

✓ In 2012 6,075.9 US dollars (42,528 RMB)

Fast but

Ranked 87th among 184 countries in the world

Population density in China



Population density map of China (2011-2012)

https://fr.wikipedia.org/wiki/Liste_des_subdivisions_de_Chine_par_population#/media/File:Population_of_China_by_first-level_administrative_regions(English).png

Present condition in China

Regional disparity in population ageing

	City, Province, Autonomous region	Population (person)	Ageing population (person)	Ratio of ageing population (%)
Economy- rich areas	**Chongching city**	**28,846,170**	**5,024,394**	**17.42**
	Shanghai city	**23,019,196**	**3,469,655**	**15.07**
	Sichuan province	**80,417,528**	**13,109,909**	**16.3**
	Jiangsu province	**78,660,941**	**12,574,637**	**15.99**
	Liaoning Province	**43,746,323**	**6,750,752**	**15.43**
	Peking city	**19,612,368**	**2,460,108**	**12.54**
Economy-poor autonomous region	**Inner Mongolia**	**24,706,291**	**2,836,413**	**11.48**
	Ningxia	**6,301,350**	**609,295**	**9.67**
	Xinjiang	**21,815,515**	**2,107,617**	**9.66**

Source: JETRO (2013)

- Ageing population density of economy-rich areas is higher than the economy-poor autonomous region.
- Ratio of population ageing of rural area is higher than that in urban area.
- Elderly person of rural area over 60 years covered 17 % of total population in 2012 and passed 20% in 2016.

Causes of population ageing

- One-child policy (1979~2015)
  - ✓ Resulted in the drop of young population by declining fertilities

https://ja.pngtree.com/freepng/family_1128011.html

- Extension of average life expectancy
  - ✓ Drop of the death rate of newborn babies
  - ✓ Improvement of the medical condition

Problems of population ageing in China

- ➢Decrease in labor participations
- ➢Depopulation of rural areas

  “Empty house” (children leave home for working) is increasing

https://baike.baidu.com/pic/空巢老人/63555/0/4b90f603738da977c52e4d3ebd51f8198618e3a7?fr=lemma&ct=single#aid=0&pic=4b90f603738da977c52e4d3ebd51f8198618e3a7

- ➢Weakening of the elderly person support from home
- ➢Lack of the welfare service for elderly people

Measures for population ageing in China

- Abolition of one-child policy (2016)
  - To be allowed to have a second child
- "The Twelfth Chinese Elderly Person Bus Development Five Years Plan" in 2011
  - ✓ To ensure the basic medical security
  - ✓ To develop ageing service facilities
  - ✓ To promote ageing culture, education and sports activities
  - ✓ To strengthen the management of ageing society, and etc.

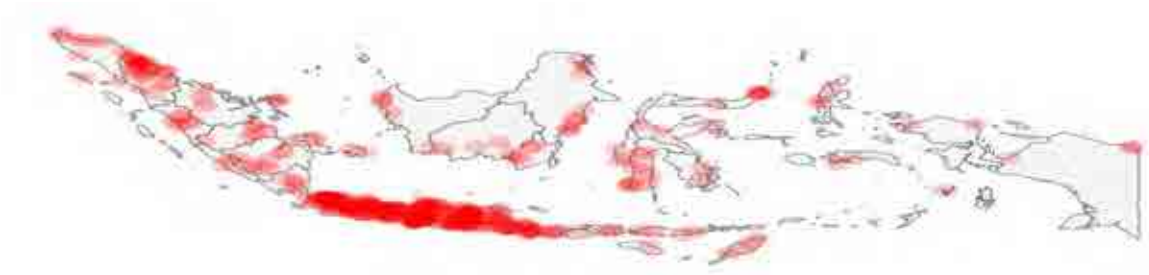
http://www.coe-cnas.jp/group_senior/manual/manual03/03.html

- Social insurance
  - ✓ Endowment insurance
  - ✓ Basic medical insurance

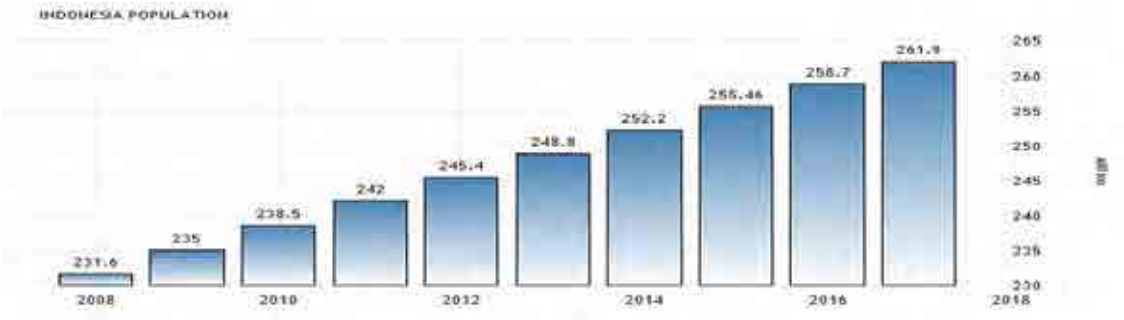
https://www.senior-anshin.com/news/kaigo/20180907/

http://photo.china.com.cn/news/2016-05/17/content_38471946_3.htm

Concreate examples: Indonesia



Map of Indonesia (red color sign of population density)



Population Trend in Indonesia

- Indonesia is known as an archipelago country because it consists of many Islands.
- Population in Indonesia is increasing year by year.

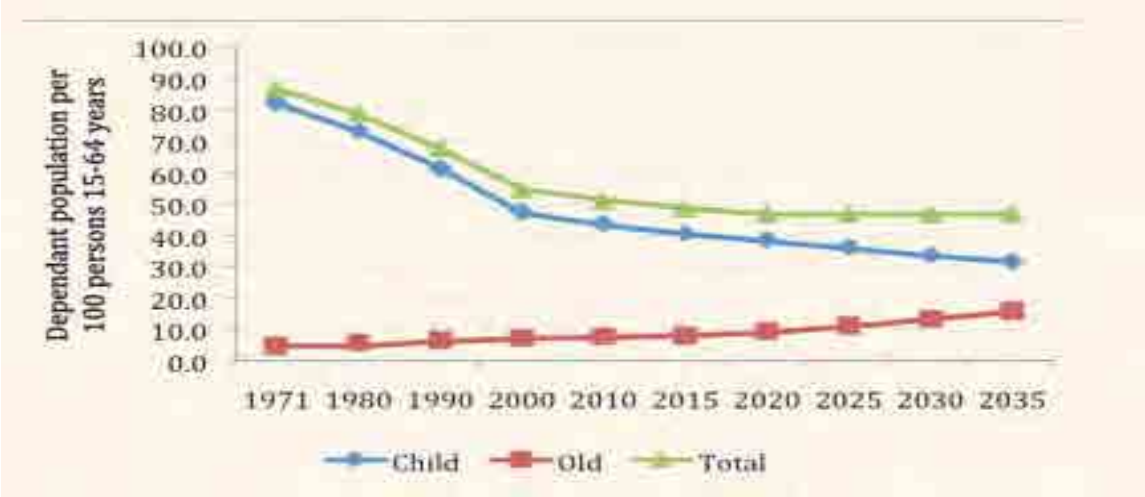
Indonesia has high population but low median age

No.	Country	Population (million)	Median Age(y)
1	China	1387.2	44.4
2	India	1324.0	27.9
3	Indonesia	255.5	28.6
4	Pakistan	191.8	23.8
5	Bangladesh	158.8	26.7
6	Russia	144.0	38.9
7	Japan	126.9	37.4
8	Philippines	100.7	23.5
9	Vietnam	91.8	30.9
10	Iran	82.0	30.1

www.Worldometers.info (world population prospects: the 2017 revision)

Present population ageing condition in Indonesia

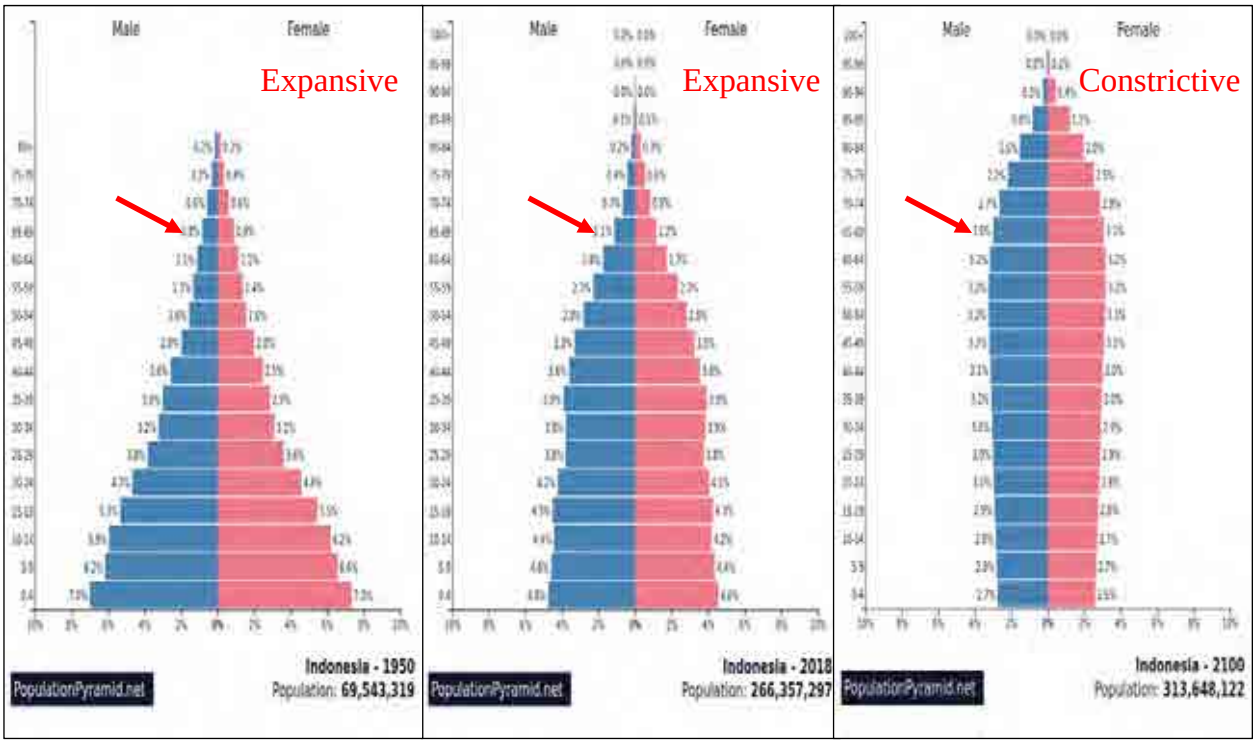
- Indonesia is known for having a young (and big) population.
- Around half of the population is below 30 years of age.
- A new study confirms that Indonesia has one of the world's most productive populations.



Comparison of young population and ageing population

Although ageing population in Indonesia is increasing year by year but the old population rate is still **lower by comparing with young population rate till 2035**.

Population Pyramid in Indonesia



- There is no transformation population type from 1950-2018
- Population pyramid will change from expanding type to constrictive with time (2100), but not in serious condition.
- It implies that Indonesia in the future will become a candidate of population ageing country.

Conclusion

- Population ageing is driven by:
  1. Declines in fertility and birth rate
  2. Increasing in life expectancy
- Problems of population ageing have two aspects:
  1. Social aspect
  2. Economic aspect
- Japan is the most population ageing country in Asia
- Developing countries in Asia will happen population ageing in the future
- It's important to think of measures against population ageing for each country

Discussion topics

1. How is population ageing condition in your country?
2. Do you think population ageing has positive effects? Why?

https://job.mynavi.jp/conts/2019/discussion/

Is eco-business an activity for environmental improvement?

Li Wenjiao (D1)
Shinohara Kenichi (M2)
Ulung Muhammad Sutopo (M1)

https://docdestruction.com

Contents

Background What is environment?

- Environment is the place, people, things and nature that surround any living organism. It is our basic life support system. It provides the air we breathe, the water we drink, the food we eat and the land where we live.

http://keynoteias.com

https://www.london.gov.uk

Air

https://4.bp.blogspot.com

Water

https://www.downtoearth.org

Food

https://www.siemens.com

Land

Background Environmental pollution

http://images.china.cn

- Air pollution
  - 4.2 million deaths every year as a result of exposure to outdoor air pollution.
  - 3.8 million deaths every year as a result of household exposure to smoke from dirty cook stoves and fuels.
  - 91% of the world's population lives in places where air quality exceeds WHO guideline limits.

- Water pollution

- Food waste

https://3c1703fe8d.site.internapcdn.net

- Land pollution

http://cf.ltkcdn.net/greenliving/images/orig/212086-3499x2325-Trash.jpg

Background Environmental improvement activity

- Environmental improvement activities are programs or activities that improve the health of persons in the community by addressing the determinants of health, which includes the social, economic and physical environment. (By WHO)

http://www.shimano.com/jp/img/csr/csr02@2x.png

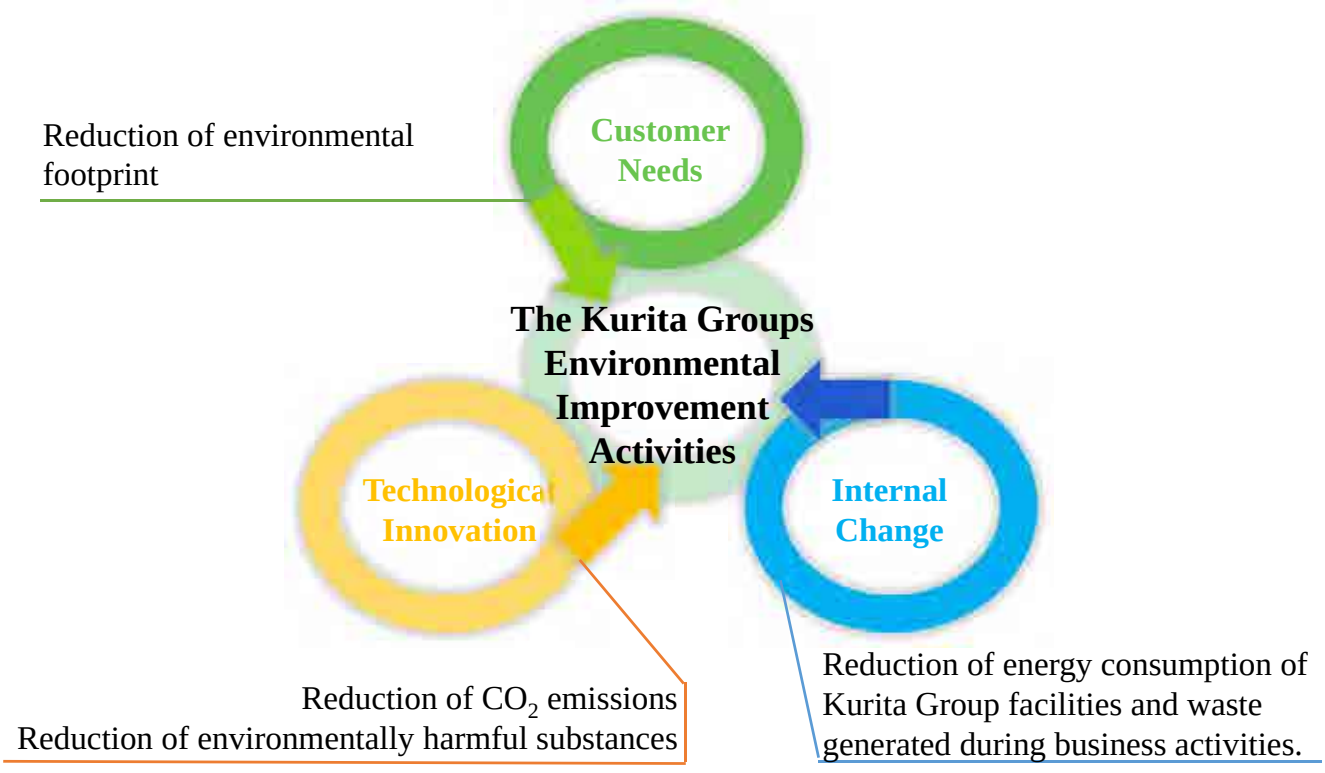

http://www.sharp-world.com

- Common objectives of environmental improvement activities are:
  - Reduce pollution.
  - Implement sustainability initiatives and cleaner production techniques (reduce pollution at source).
  - Provide public access to information on the nature and timing of the improvements being made.
  - Assist someone who has intention and willingness to improve environmental performance.
  - Others (Environmental improvement programs) www.epa.nsw.gov.au

https://thumbs.dreamstime.com

Environmental improvement activity : Kurita Groups

The Kurita Group has accumulated the technological know-how on water treatment since its foundation in 1949.



www.kurita.co.jp/english/csr/csr_activity/environment/index.html

Environmental improvement activity : Yuken Groups

Yuken business boundary to all types of metal, plastics, new ceramic binders and chemicals. Yuken Groups have developed products based on ideology of environmentally friendly and human friendly.

http://www.yuken-ind.co.jp/en-US/environment/environment01.html

All stakeholders are expected to contribute to environmental protection

"Eco-" and "business"

http://yournaperville.com

➢ What is "eco-"?

"Eco-" is a prefix mostly relating to ecological or environmental terms. Recently it is becoming established as a general term "eco", but the official name is "ecology". Ecology is the idea of protecting the natural environment and aiming for people and nature to coexist.

➢ What is "business"?

"Business" is the activity of making one's living or making money by producing or buying and selling products (goods and services). It is any activity or enterprise entered into for profit.

What is eco-business?

- Eco-business is an enterprise or activity that has minimal negative impact on the global or local environment.

Environmental improvement activity?

- In general, business is described as eco-business if it matches the following four criteria:

  - It incorporates principles of sustainability into each of its business decisions.
  - It supplies environmentally friendly products or services that replaces demand for nongreen products and/or services.
  - It is greener than traditional competition.
  - It has made an enduring commitment to environmental principles in its business operations.

What is eco-business like?

- Zero emissions

  A typical example of eco-business is a project called “zero emissions”. Zero emissions is an effort to zero emissions such as waste, dust, gas and wastewater in the process of generating products and services.

https://thesustainableinvestor.files.wordpress.com

https://newsonia.com

- Recycling

  A process of converting waste materials into new materials and objects. It is an alternative to “conventional” waste disposal that can save material and help lower greenhouse gas emissions (compared to plastic production, for example).

https://www.rumpke.com/for-your-home/recycling/acceptable-items

What is eco-business like?

- Sustainable energy

  Including renewable energy sources, such as hydroelectricity, solar energy, wind energy, wave power, geothermal energy, bioenergy, tidal power and also technologies designed to improve energy efficiency.

https://www.clearwater.org/wp-content/uploads/2013/11/TGEE_Summit_Banner.jpg

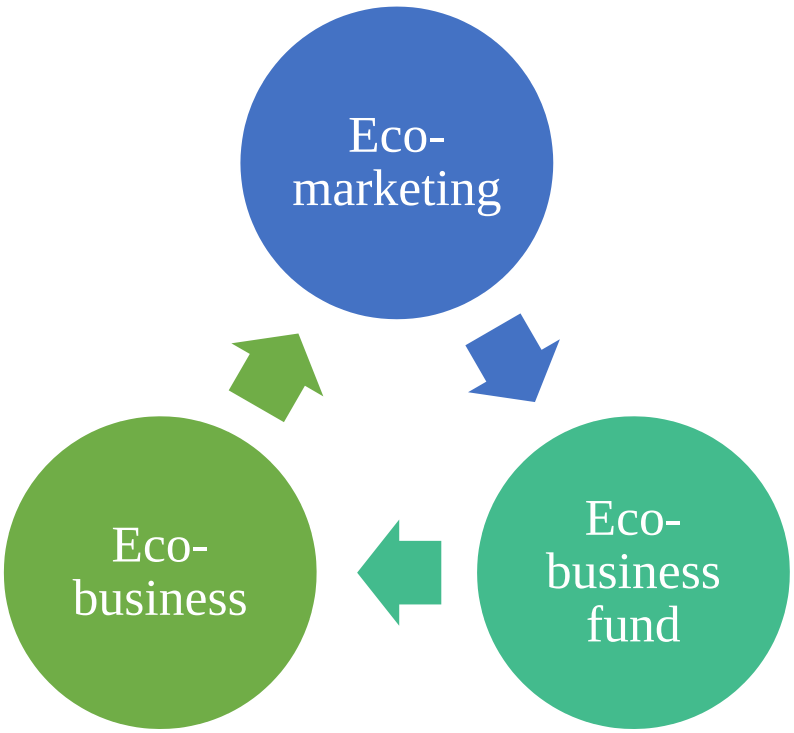
- Greening

  The act of greening involves incorporating “green” products and processes into one's environment, such as the home, work place, and general lifestyle. “Green” product has less of an environmental impact or is less detrimental to human health than the traditional product equivalent.

http://www.go-green.ae/images/green-products-banner.jpg

How does eco-business work?

- Flow chart



Eco-marketing

Also known as environmental marketing or green marketing

- American Marketing Association

"Green marketing is the marketing of products that are presumed to be environmentally safe."

- Oxford Dictionary of Business & Management

"Green marketing implies marketing products that benefit the environment"

https://www.flickr.com/photos/63008913@N00/364367745/

https://www.yelp.se/biz/honest-green-market-providence-3

Eco-marketing

- Eco-marketing consists of all activities designed to generate and facilitate any exchanges intended to satisfy human needs or wants, such that the satisfaction of these needs and wants occurs, with minimal detrimental impacts on the natural environment.
- By focusing on 4 elements to maximize marketing effectiveness.

Product

Place

Price

Promotion

https://inhabitat.com/is-it-green-clorox-green-works/
https://openclipart.org/detail/103369/eco-friendly-product-sticker

Eco-business fund

- **The eco-business fund** is a joint initiative of investors' intent on supporting the promotion of business and consumption practices that contribute to biodiversity conservation, the sustainable use of natural resources, climate change mitigation and adaptation to its impacts.

- In providing financing to the fund's target group for investing in activities that conserve nature and foster biodiversity, the eco-business fund seeks investments that yield both financial and environmental returns.

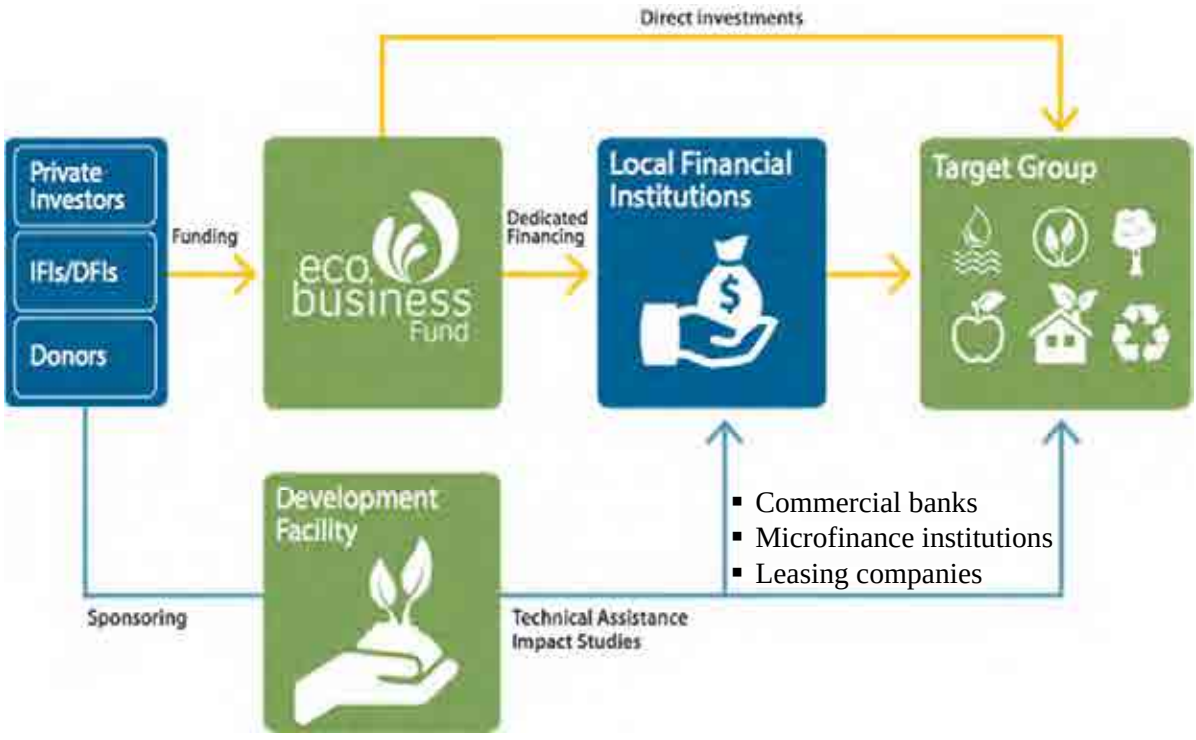
- For businesses that are recognized as eco business, there are also privileges such as permission to use investment trusts called "eco funds", and in recent years they have gained attention as a new business genre.

http://www.ecobusiness.fund/about-the-fund/

Eco-business fund

Investment mechanism

From investors to final borrowers



http://www.ecobusiness.fund/about-the-fund/

Eco-business fund

- The eco-business fund concentrates on the following four sectors:

Agriculture and agri-processing

Fishery and aquaculture

Forestry

Eco-tourism

http://www.ecobusiness.fund/about-the-fund/

Eco-business in China

Promotion of eco-business in China

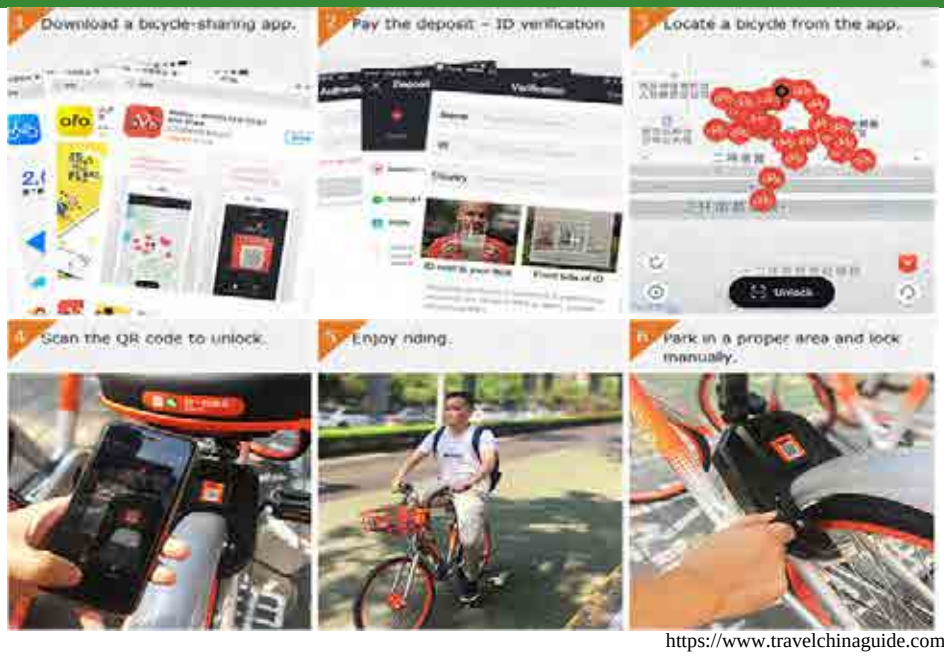
- Eco-business is also called green business and 绿色金融 in Chinese character.

https://gss1.bdstatic.com
Eco-business product mark

- China's latest round of green policies offers opportunities for environmental and renewable energy companies.

- Environmental improvement is one of the eight priorities in this year's Government Work Plan, while the 13th Five-Year Plan outline presented to the National People's Congress also calls for stringent environmental regulations. Eco-business can reap China's environmental policy rewards.

Bicycle-sharing in China



https://www.travelchinaguide.com

- Bicycle-sharing programs have been flourished in China at an impressive speed. These bicycles seem to have invaded most cities overnight.
- Nowadays, there are over 30 operators providing more than 10 million bicycles hitting the streets in China. It has become a popular and healthy transportation option for short-distance journey.

Bicycle-sharing in China

➢ CO_2 emission

Emission coefficients of different urban transportation tools

Emission coefficient (g/km)	CO	NO_2	PM2.5	PM10	CO_2
Bus (diesel)	1.62	8.64	0.126	0.14	73.8
Taxi (gasoline)	2.25	0.095	0.003	0.003	178.6
Personal car (gasoline)	0.46	0.017	0.003	0.003	178.6

Source: Bike Sharing and the Economy, the Environment, and Health-Related Externalities.

- Riding a bicycle accounts for about 21 g of CO_2 emissions per kilometer (date from the average European diet).

About 10 times less than a car!

- Europeans still eat quite a lot of meat, which needs up to 1500 g of CO_2 emissions per 100 calories produced. Climate-friendly, vegetarian and local food produces much less CO_2 (11 g for corn, 23 g for potatoes, for example). If more people changed their eating habits, the bicycles' carbon record could be even better – not to mention the health benefits of both cycling and a healthy diet.

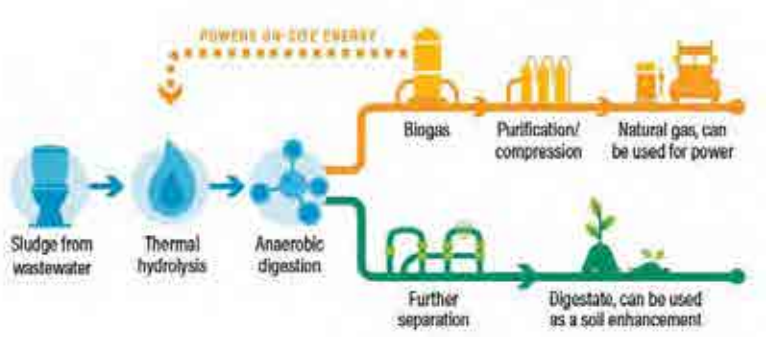
Recycling sludge for energy in China

➢ Sewage—refuse liquids or waste matter usually carried off by sewers—is at the front lines of a global movement for clean energy. Innovative cities in the United States are digging into their dirtiest depths to create new sources of power that optimize economic benefits, generate clean energy, and control pollution.

➢ This wastewater-to-power movement is just beginning to catch on in China. But with some of the largest and most densely populated cities in the world, China could be poised to lead a sludge-to-energy revolution.

http://www.eco-business.com

The pumping stations of the Sha Tin Sewage Treatment Works in Hong Kong, China.



https://vertassets.blob.core.windows.net

Renewable energy in China

- China recently rolled out the world's largest investment in clean energy to date and also committed to both manufacturing and adopting renewable energy technologies.
- According to Greenpeace, China installs an entire soccer field's worth of solar panels and erects a new wind turbine almost every hour. China accounted for more than 40 percent of capacity growth in global renewable energy in 2016.

http://www.chinadaily.com.cn

Solar power projects: giant pandas in Datong, Shanxi Province.

Green product in China

- Disposable chopstick demand is killing China's forests as annual production reaches 80 billion. 20 million 20-year-old trees would be required to cover China's annual chopstick production.
- Bamboo is considered as a good substitute of wood.
  - Grows in a variety of conditions
  - No fertilizer, pesticides, or herbicides needed
  - Very little waste, can use every single piece of bamboo
  - Amazing growth rate (can be harvested in one to five years)
  - Absorbs more CO_2
  - Edible

http://mae.supplies/wp-content/uploads/2015/11/bamboo-saves-the-planet-800x432.jpg

https://ae01.alicdn.com

Wood

https://images-na.ssl-images-amazon.com

Bamboo

Eco-business in Japan

Promotion of Eco-business in Japan

Eco Mark

https://www.ecomark.jp/about/

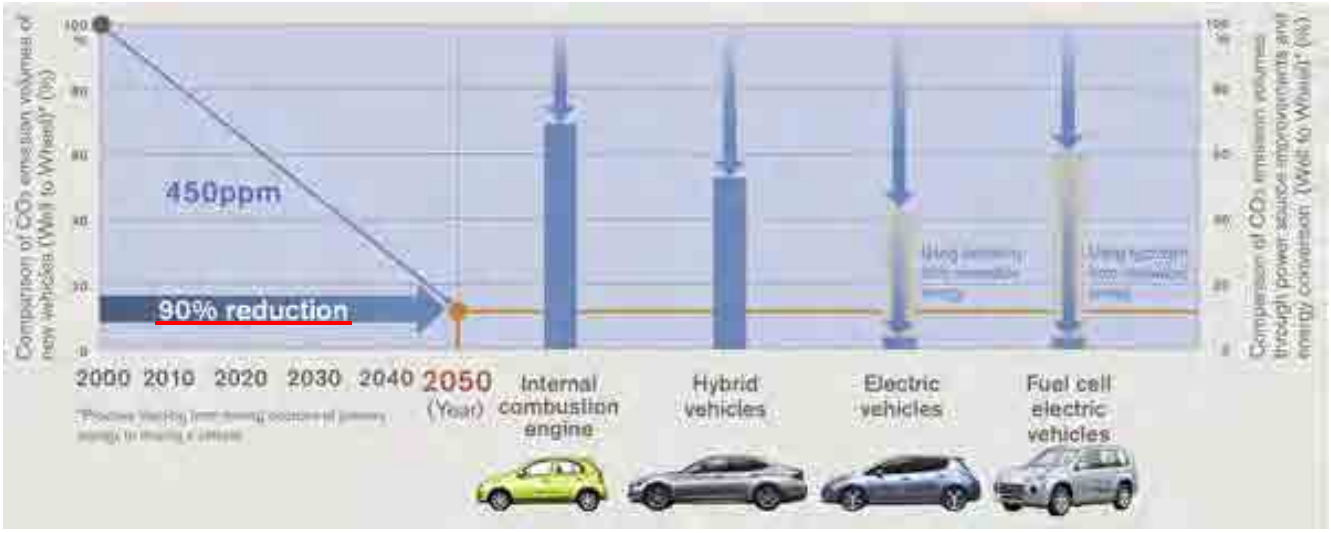
http://bizmakoto.jp/makoto/articles/0709/28/news105.html

Eco Mark is an environmental label that can be attached to products that are less burdened on the environment throughout the entire lifecycle, from "production" to "disposal", among various products (products and services), and are recognized as useful for environmental conservation.

Zero emissions in Japan

Zero emissions by NISSAN

In order to realize a sustainable society, Nissan is committed to becoming a leader in zero emission vehicles, aiming to spread zero emission vehicles that do not emit CO_2 at all when driving.



https://www.Nissan-global.com/JP/TECHNOLOGY/OVERVIEW/zero_emission.html

Recycling in Japan

Recycling by Sekisui House

Sekisui House has been working on recycling waste materials generated at factory production and achieved zero emissions of "zero incineration, zero landfill disposal" in 2002. Since then, while considering the quality of recycling, the company maintains and continues operations.

Punch chips generated by bolt hole drilling

Regenerate to a steel frame etc in a blast furnace

Recycled rebar

https://www.sekisuihouse.co.jp/sustainable/recycling/objective2_2/index.html

Renewable energy in Japan

Offshore wind power generation by Softbank group

- Offshore wind power generators are located in a wide area, and they can obtain a relatively stable wind throughout the year compared to on land

- Offshore wind power Plant Mega Site Kashima can supply electricity more than 60,000 households per year

Large Scale Offshore Wind Power Plant Mega Site Kashima in Ibaraki prefecture
http://www.komatsuzaki.co.jp/windpower/kamisu3.php

Greening in Japan

Greening

- Physiology/psychological effect

Restoration of techno stress, creation of relaxation and peacefulness.

- Eco-up effect

Protect and enhance biodiversity in urban areas.

- Physical environment improvement effect

Together with the green of parks, street, etc., air quality improvement, heat island mitigation, rain water runoff alleviation, etc.

http://www.asahi-ko-san.co.jp/green_park.html

http://www.typosthes.gr/gr/topika/article/127646/thessaloniki-shedio-gia-ton-proto-kipo-se-toiho-tis-polis/

Eco-business in Japan

Others

When you buy an eco-gift,

tree planting is done,

a tree-planting certificate and a message arrive

Eco-gift

https://wowma.jp/user/12834244/1

http://www.tupperwarebrands.jp/shopdetail/000000000026/

Eco-bottle

https://toyota-efami.com/use/exchange/entry-182.html

Eco-bag

Eco-business in Indonesia

Promotion of Eco-business in Indonesia

It is the mark that is attached on a product which is available in our daily lives as well as certified as contributing to environmental preservation in terms of less environmental burden. It is also aimed for the consumers to make an environmental - friendly product choice, and also to consider the relation of life and environment.

The Indonesian Eco-Mark/labelling Institute promotes sustainable management of Indonesia's forests through the establishment of an eco-labeling certification system for Indonesia's forest products.

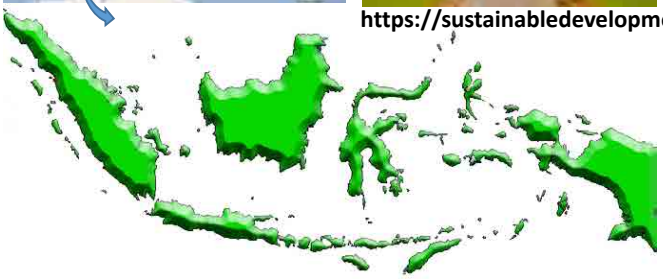
Ramah Lingkungan

www.indonesiagreenproduct.com/ekolabel-dan-peningkatan-daya-saing-produk/

Eco business in Indonesia : eco-tourism




https://sustainabledevelopment.un.org/content/documents/4488Nirvandar.pdf



Population : 237 million people
More than **17,100** islands
More than **300** distinct native ethnicities
742 different languages and dialect

Indonesia is the largest archipelago and the fourth most populous country in the world.

Extending 5,120 km from east to west and 1,760 km from north to south, with total land area 1.9 million km^2 and 7.9 million km^2 (including sea).

Eco-tourism in Indonesia

Foreign exchange sources in Indonesia

No	2014		2015		2016	
	Sectors	Value (Million USD)	Sectors	Value (Million USD)	Sectors	Value (Million USD)
1	Oil and Gas	30.318	Oil and Gas	18.574	CPO	15.965
2	Coals	18.697	Coals	16.427	Tourism	13.568
3	CPO	18.615	CPO	14.717	Oil and Gas	13.105
4	Tourism	11.166	Tourism	12.225	Coals	12.898
5	Confections	7.450	Confections	6.410	Confections	6.229
6	Electrical Equipment	7.021	Electrical Equipment	4.510	Electrical Equipment	4.561
7	Chemical Compound	6.486	Rubber	3.564	Ornament	4.119
8	Rubber	6.256	Paper	3.546	Paper	4.032

The Indonesian Tourism and Creative Economy Minister

The Indonesian Tourism and Creative Economy Minister said that in 2019, the tourism sector is predicted to be the largest foreign exchange earner for Indonesia.

Eco-tourism in Indonesia

Eco-tourism in Indonesia defined as

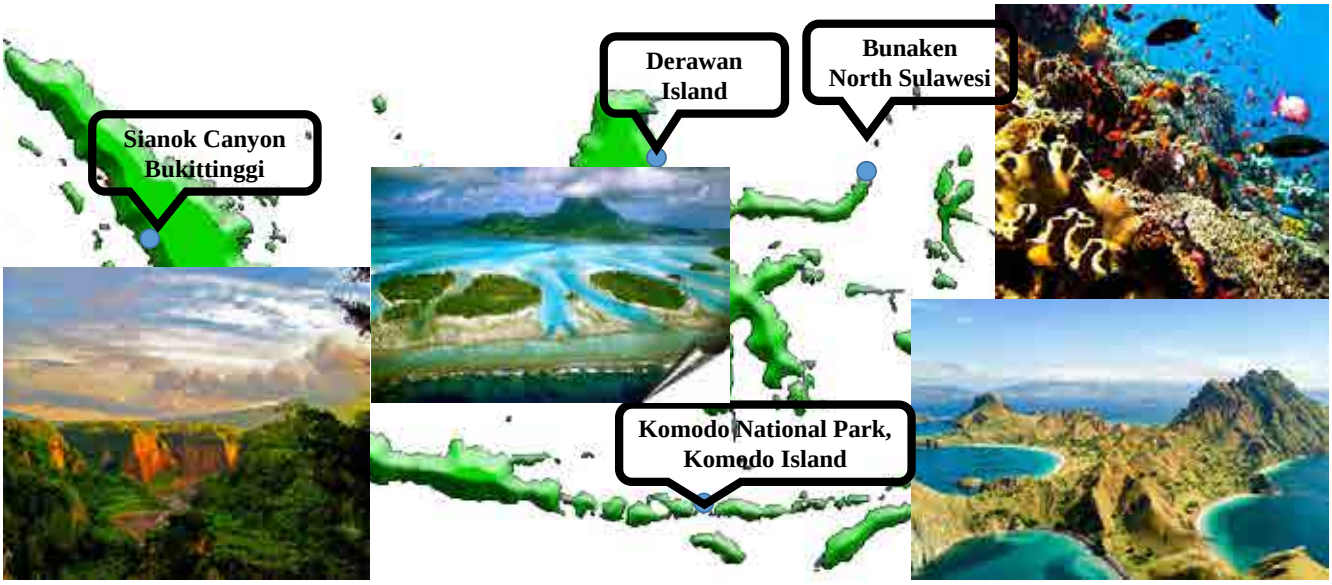
“activities of responsible travelling in intact areas or in areas which are named according to the role of nature”

The purpose of such activities are :

- ❖Being to enjoy natural beauty.
- ❖Involving education, understanding and supports conservation.
- ❖As well as increasing the income of the local communities.

https://baswaramursyid.wordpress.com/2015/09/30/wonderful-indonesia-campaign/

Destination eco-tourism in Indonesia



https://sustainabledevelopment.un.org/content/documents/4488Nirvandar.pdf

Importance of eco-tourism

Ecotourism Reduces our Carbon Footprint

Commuting is unavoidable when traveling, but there are adventurous ways to cut back on transport that adds to pollution in the air. While on a trip, explore guided areas that offer tours on foot.

Ecotourism is valuable for people and the Planet

As an eco-tourist, you travel with more than personal satisfaction in mind. You help the planet and you enable people to lead a more fulfilling life.

Ecotourism Promotes Economic Stability

Traveling to local attractions offers exciting experiences and the funding you provide to these places is shared amongst the community, contributing to more jobs and a boost in the local economy.

Conclusion

Eco-business can

- Prevent air pollution and global warming due to low emission
- Link energy efficiency and material efficiency initiatives with efforts to reduce waste and some toxic
- Enhance environmental awareness and reduce personal environmental hazards
- Increase life expectancy by using green products

Eco-business is an activity for environmental improvement

Discussion topics

1. What kind of eco-business do you know in your country or city and why it is promoted?

2. What kind of eco-business you will do if you are a businessman or businesswoman?

https://www.gobarefoot.co/assets/img/slider1.jpg

Future Prospects of Eco-Business in Asia

Presented by:

Naohiro Makita Aldilla Afiani Alda

http://planetsave.com/2012/11/19/eco-business-carbon-reduction-generators-and-other-tips/

Outline

- Background
- Eco-business Definition
- Basic Structure of Eco-business
- Characteristics
- Advantages of Eco-business
- Relations among Eco-business stakeholders
- Green business practices
- Eco-business in the world
- Eco-business in Asia and future prospects
- Summary
- Discussion Topic

Background

Biodiversity Losses

According to some estimates, between 13% and 42% of species will be lost in Southeast Asia by 2100, at least half of which could represent extinct species (Sodhiet al., 2010).

Abnormal Weather and Global Warming

Extreme weather occurs mainly due to irregular natural variations in the atmosphere and the ocean.

Air Pollution and Waste

Source:www.china.org.cn/environment/2011-12/18/content_24184374.htm

Source:https://www.gizmodo.com.au/2012/11/garbage-mountain-and-armoured-cars-new-york-still-in-ruins/

Background

Environmental Protection

All parts of our earth need to be protected from any pollutions and damages

Hokkaido-Japan

Source:sounkyo-kankou.co.jp/kanko/

Kapuas River-Indonesia

Source : https://www.wwf.or.id/?26220/kualitas-air-sungai-mendalam-di-kapuas-hulu-mulai-membaik#

Yangshuo-China

https://tempatwisataunik.com/wisata-dunia/wisata-asia/tempat-wisata-di-china

Contribution to Solve Environmental Problems

All stakeholder (government, company, user, user's user, society, environmental organizations, etc.) are expected to contribute to solution of environmental problems.

Source:http://event21.co.jp/oth336_trash.htm

Eco-business Definition

Environmental strategies?

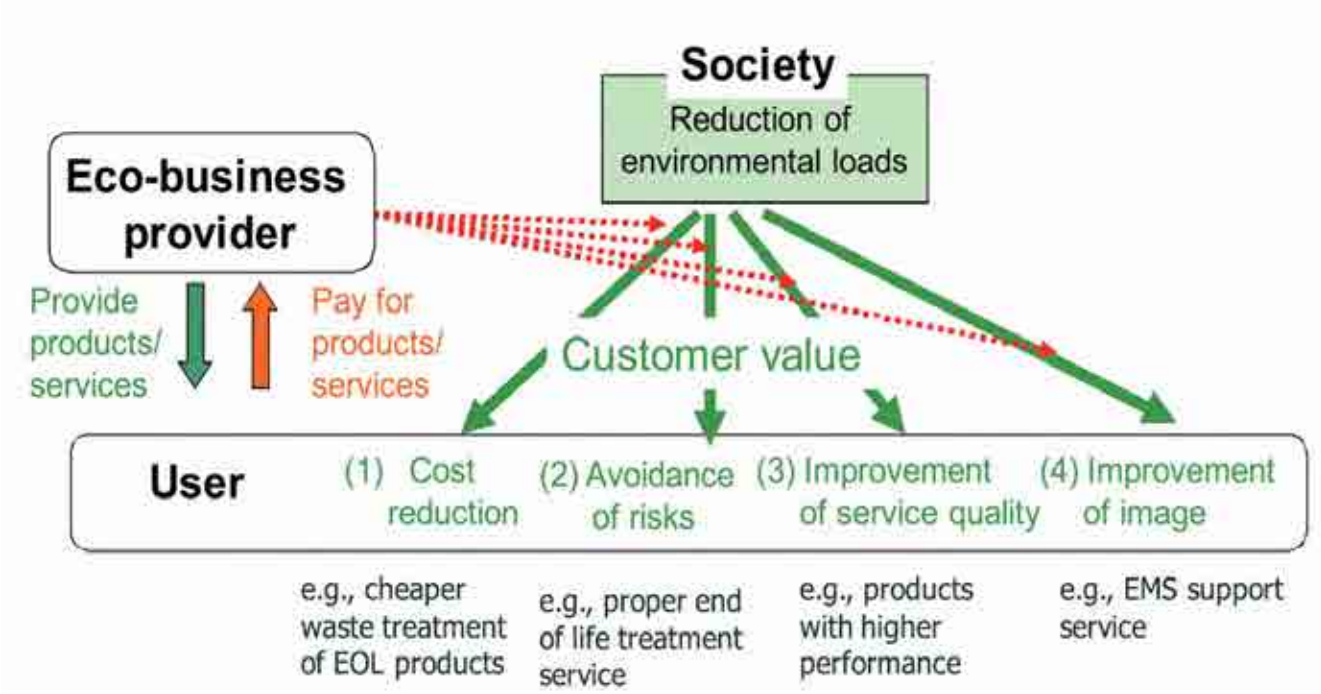
Eco-business(One way)

What is Eco-business?

Source : https://kyotoreview.org/issue-2-disaster-and-rehabilitation/trends-in-ecological-studies-of-west-malesian-rainforests

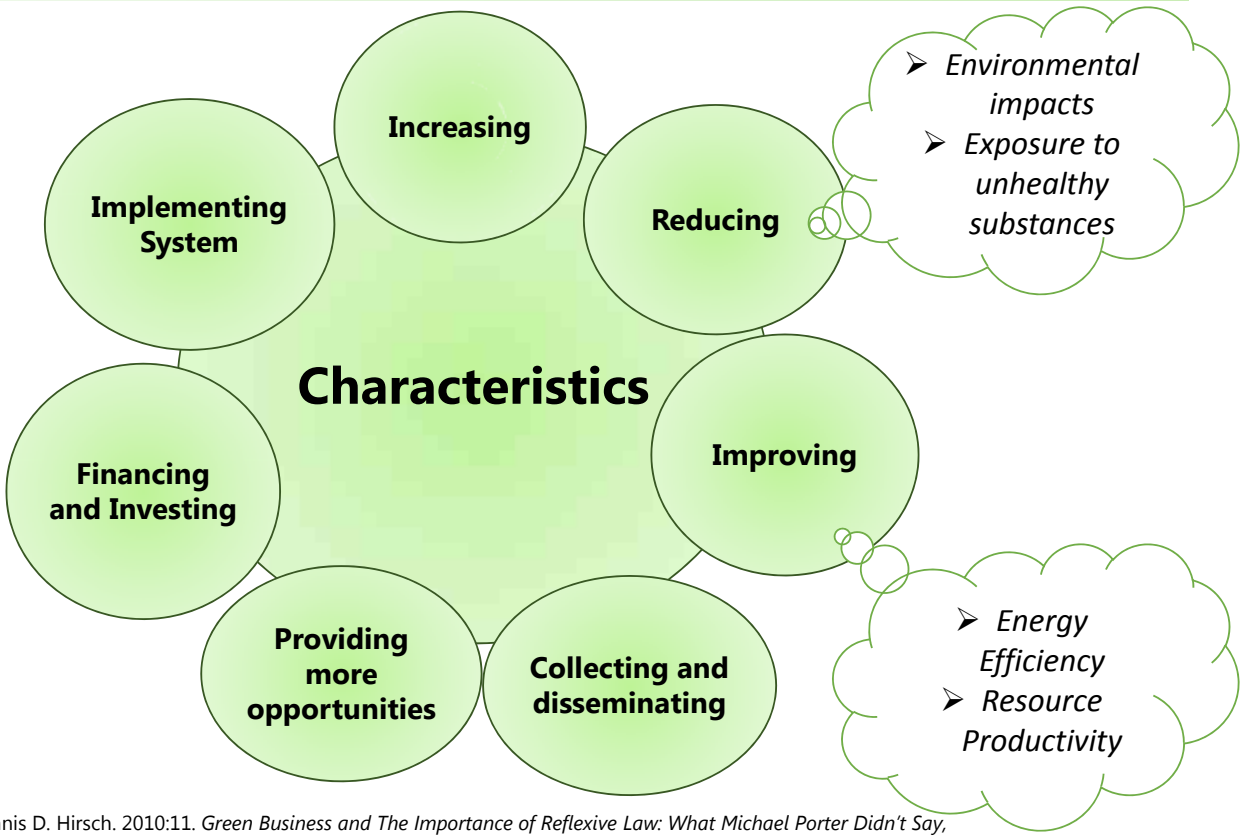
System that pay attention and care to environmental, resources (environmentally sustainable), green output, renewable energy, environmental protection, profitability, and humanity aspect of their activities (socially responsible)"

Basic Structure of Eco-business



Source : Kondoh, S. et al.2012.Analysis of Key Success Factors for Eco-Business Through Case Studies in Japan

Characteristics



Dennis D. Hirsch. 2010:11. *Green Business and The Importance of Reflexive Law: What Michael Porter Didn't Say,*

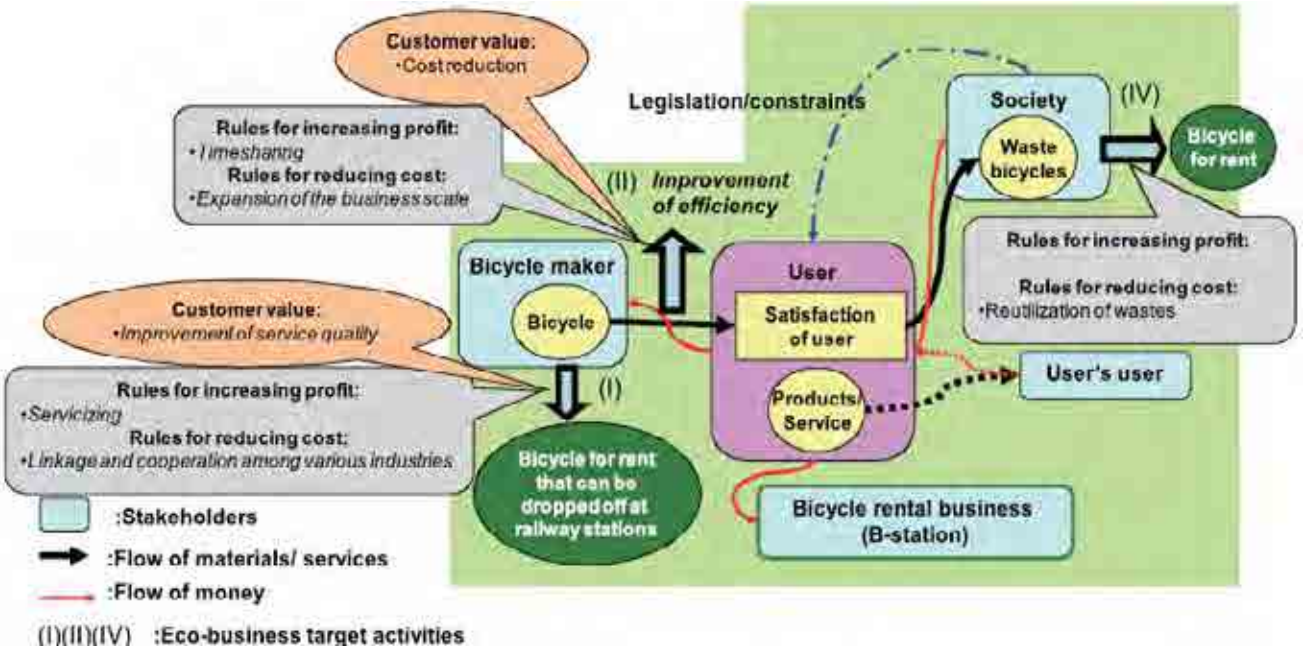
Advantages of Eco-business

Source : http://all-free-download.com/free-vector/download/eco-logo-idea-green-words-and-globle-icons_6826767.html

- Produce renewable source
- Improve eco consciousness of daily work
- Reduce cost
- Environment and resources protection
- Reduce the amount of resources used
- Save human life

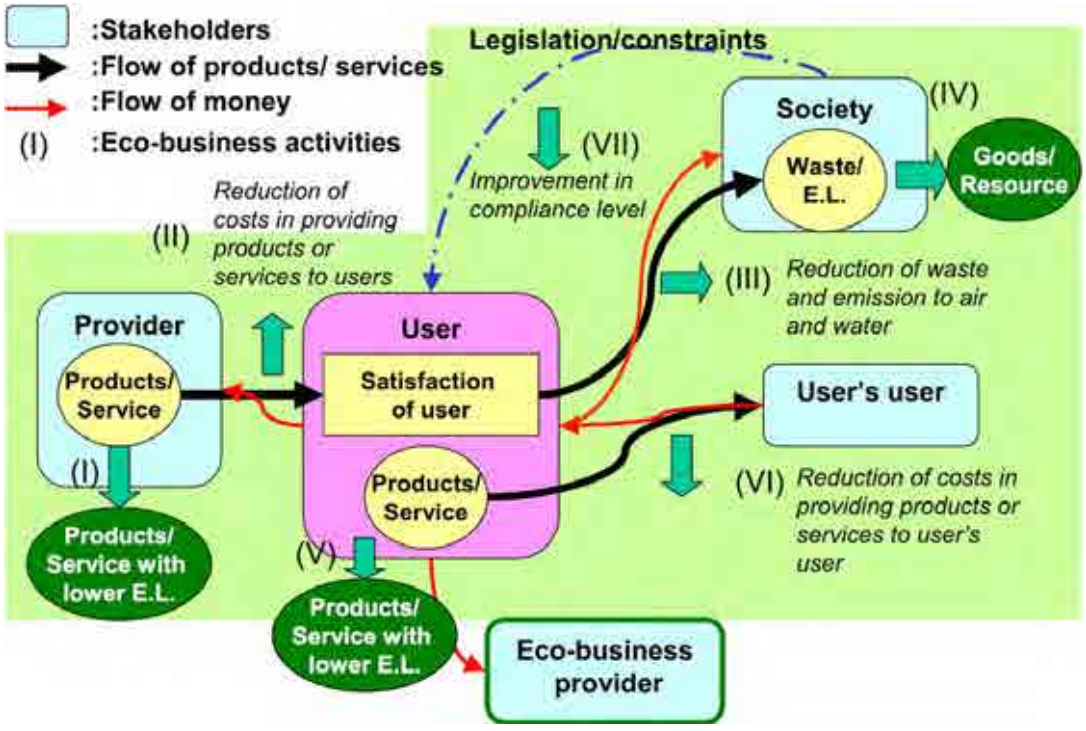
Advantages of Eco-Business

Example: Bicycle Rental Business at Railway Stations



Source : Kondoh, S. et al.2012.Analysis of Key Success Factors for Eco-Business Through Case Studies in Japan

Relations among Eco-business stakeholders



Source : Kondoh, S. et al.2012.Analysis of Key Success Factors for Eco-Business Through Case Studies in Japan

Green Business Practices

Source: ISSN 1392-1258. EKONOMIKA 2014 Vol. 93(1)

Eco-business in the World

America

Rental furniture

Rental furniture is often used when you know that the period is as short as 1 to 3 years when borrowing a house or apartment in the USA.

There is also a great set of beds and tables together, which can be said to be a service unique to the United States, such as international students and businessmen who have a temporary stay.

CORT FURNITURE RENTALS FOR INTERNATIONAL STUDENTS

Source : https://studyusa.com/ja/a/788/留学生ハウジングガイド

Source : https://junkjam.jp/

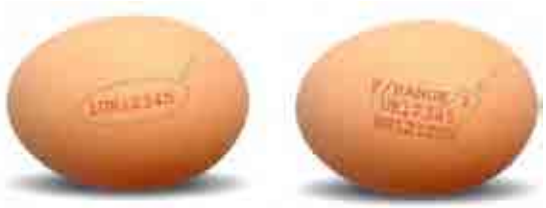
Eco-Business in The World

Europe

Foodmiles.com

This site shows eco friendly information that the total transport distance until foodstuff reaches consumers.

The shorter the miles, the lower the consumption of gasoline and the emission of carbon dioxide. Moreover, since the economies of local suppliers will benefit, they can also contribute to the expansion of local employment.

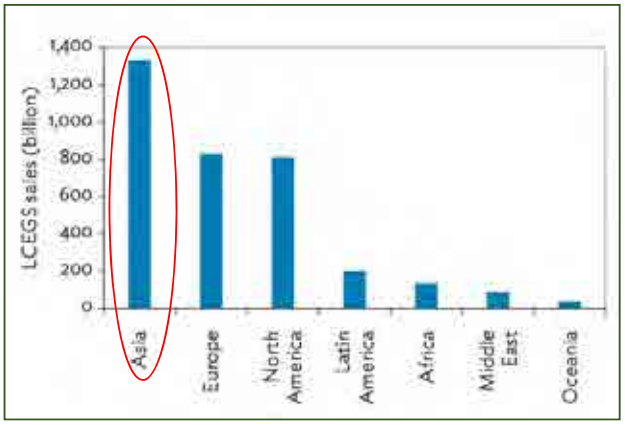


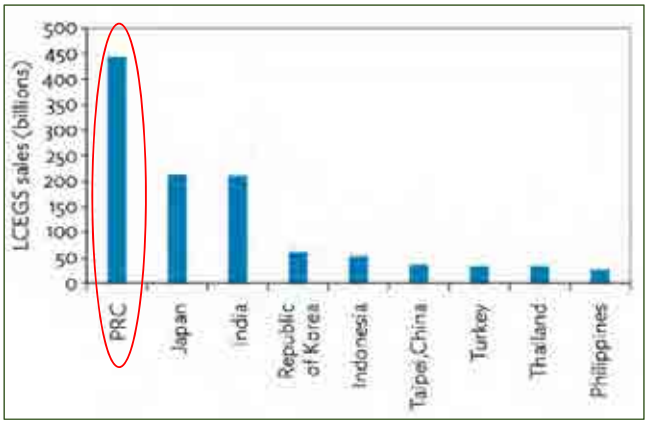
You can get freshness by buying eggs as close as possible to miles.

Souce: https://www.jnews.com/eco/2015/001.html

Eco-business in Asia

Largest Absolute Value Low-Carbon Environmental Goods and Services





GDP = gross domestic product, LCEGS = Low-Carbon Environmental Goods and Services, PRC = People's Republic of China.
Note: Data are from 2011 to 2012.
Sources: United Kingdom Department for Business, Innovation and Skills 2011; Vivid Economics.

Source: Sam Fankhauser, Alex Kazaglis, and Sugandha Srivastav. 2017. Green Growth Opportunities for Asia

Eco-Business in Asia

Kind of Eco-Business in Asia

- Solar power
- Eco car(emission)
- Detergent refill
- Share cycle

Etc…

Source : http://yamaguchi-masumi.blogspot.com/2012/04/blog-post_28.html

Source :https://www.allinallnews.com/vehicles/toyota-mirai

Source : http://prideproducts.com/?page=search&cat=3406

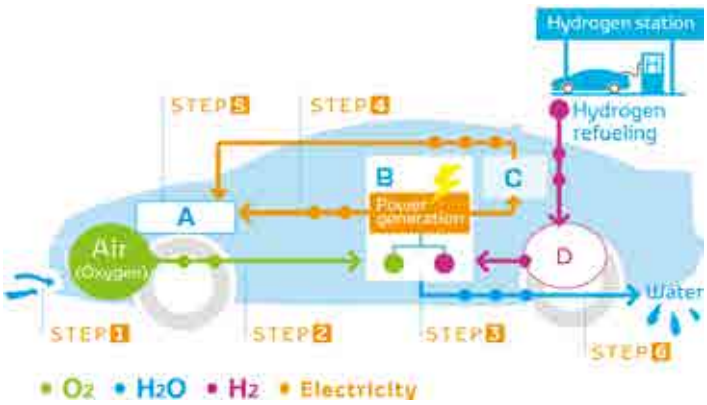
Source : www.gia-jsca.net/

Eco-Business in Asia and Future Prospect

Japan

TOYOTA's MIRAI

Fuel Cell Vehicle(FCV)



A. Motor, B. Fuel cell stack, C. Battery, D. High-pressure hydrogen tank

Operating principals

1. Air (oxygen) taken in
2. Oxygen and hydrogen supplied to fuel cell stack
3. Electricity and water generated through chemical reaction
4. Electricity supplied to motor
5. Motor is activated and vehicle moves
6. Water emitted outside vehicle

Source : http://www.Toyota-global.com/innovation/environmental_technology/technology_file/fuel_cell_hybrid.html

Eco-Business in Asia and Future Prospect

Japan

TOYOTA's MIRAI

Fuel Cell Vehicle(FCV)

Source : https://www.allinallnews.com/vehicles/toyota-mirai

The benefit of hydrogen:
1. Zero emissions, ultimate eco-energy
2. Almost infinite existence
3. It can be stored and carried.

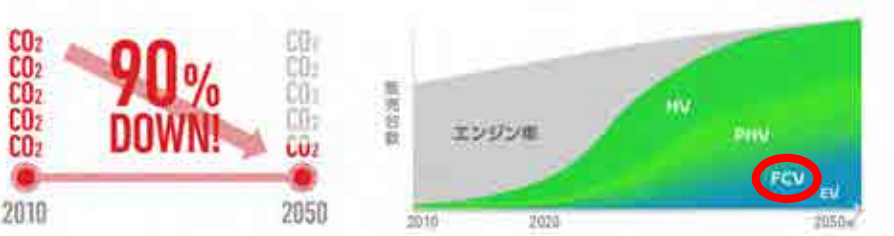
In general, electricity is difficult to keep after electricity generation or energy to transport far. But for hydrogen, we use hydrogen made in the summer for the winter.

Eco-Business in Asia and Future Prospect

Japan

Nowadays location of 90 hydrogen station in Japan

Future prospect on CO_2 emission & FCV sales



Source : , http://hydrogen.st/,https://www.toyota.co.jp/jpn/tech/environment/strategy.html

Eco-business in Asia and Future Prospect

China

Alibaba group

Eco-logistics movement

Recycling of resources and reuse of packaging throughout the logistics market.

→ collecting cardboards, developing new energy, spreading eco packaging, etc.

Alibaba President said about Future prospect

"***There will be an era*** in which the number of home delivery items will reach an average of 1 billion a day soon, I want all people to pay attention to" eco "once again.

Source:https://www.alibaba.com/

Eco-Business in Asia and Future Prospect

Indonesia

ASTRA international's AGYA

New model for developing country

AGYA of cheap Asian car (a model in which Indonesian original design merged with high reliability of Japanese manufacturer)

→ This car certified by **Indonesian policy "low cost green car (LCGC) policy"**

Business tie-up with Japanese automobile manufacturer, low fuel consumption

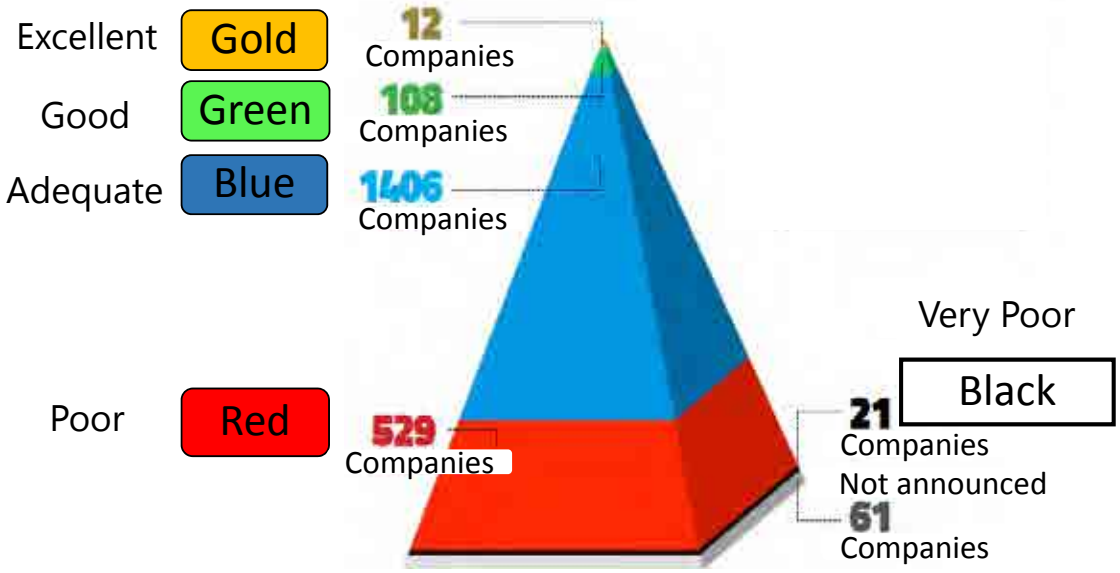
Indonesia original design

Source : http://motordanmobil.blogspot.jp/2013/05/KumpulanGambarMobilToyotaAgyadanDaihatsuAyla.html

Eco-business in Asia and Future Prospect

Indonesia

Program for Pollution Control, Evaluation and Rating (PROPER)

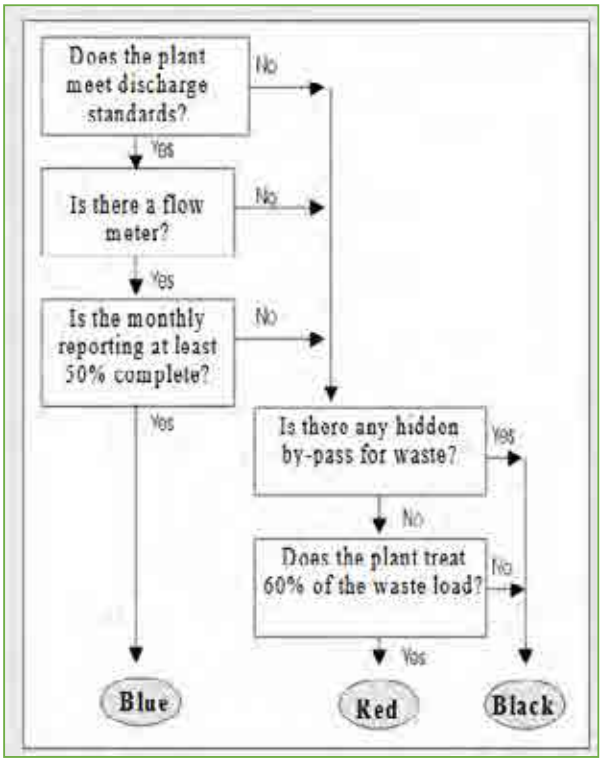


Proper Criteria Rating-Proper Assessment Results 2015

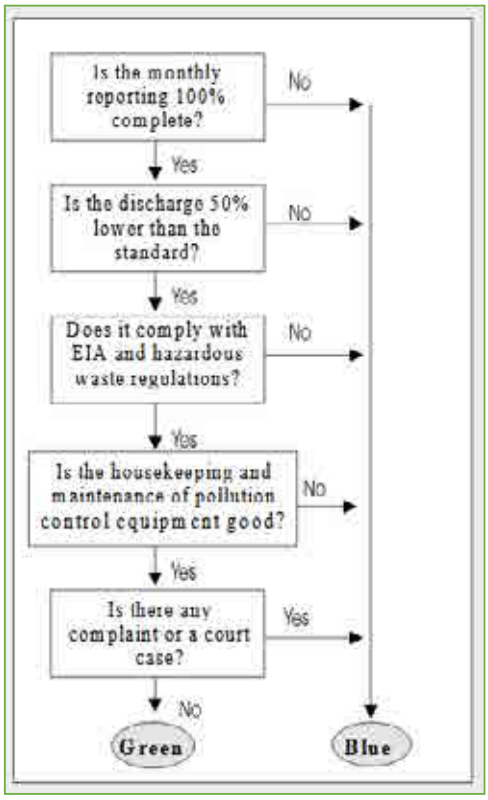
https://www.performeks.com/media/downloads/vincent.pdf

Eco-business in Asia and Future Prospect

Proper Criteria Rating



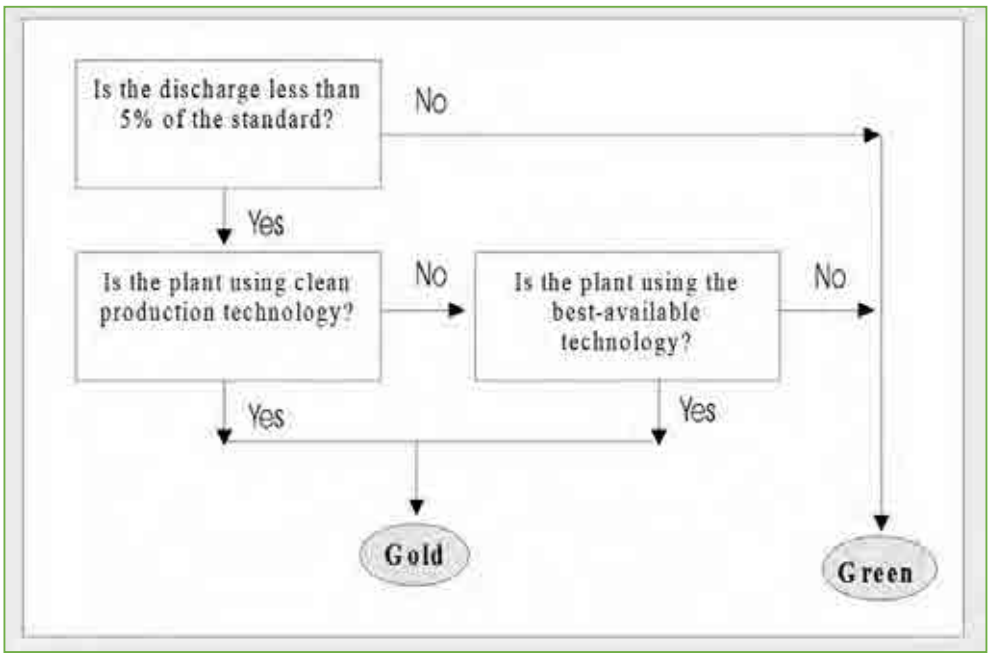
Criteria for Blue vs Red vs Black Ratings



Criteria for Blue vs Green Ratings

Eco-business in Asia and Future Prospect

Proper Criteria Rating



Criteria for Green vs Gold Ratings

Summary

- ✓Environmental problems including biodiversity losses, abnormal weather and global warming, air pollution and waste, environmental protection and so on, are reasons for us to do eco-business
- ✓To do eco-business needs all stakeholders working together and having consistent policy
- ✓In Asia there are so many ways conducting eco-business such as hydrogen-fueled car, eco packaging, power saving, program for pollution control and evaluation, eco labelling, seminar, waste sorting, etc.

Discussion Topic

- If you are a businessman, how you do eco-business ?
- Do you have any ideas for conducting eco business in Asia?

Rural population decrease and urbanization

- Thinking from the influence to environment -

M1 Keisuke Ozeki
M1 Takuya Okada
M1 Bejoy Kumar Barman

Contents

- Rural population decrease and urbanization
- The definition of urban
- Pattern and trend of urbanization in the world
- Causes of rural population decrease and urbanization
- Environmental influences of rural population decrease and urbanization
- Concrete examples (in Japan and Bangladesh)
- Conclusions
- Discussion Topics

What is rural population decrease and urbanization?

Rural population decrease

Rural population means the population who are living in the un-urban area .
Decrease means population declines from that area.

When one occurs, the other progresses.

Urbanization

Urbanization is the increase in the number of people living in cities due to migration from rural areas and natural increase.

How to define the area which is urbanized?

No common definition was founded to define an area which is urbanized. But, every country in the world follow their own policy for identifying the urban area.

Generally, there are some measuring **parameters** which are used to define an area an urban area.

1. Population size
2. Population density
3. Area
4. Economic and social organization
5. Economic function
6. Labor supply and demand
7. Administration

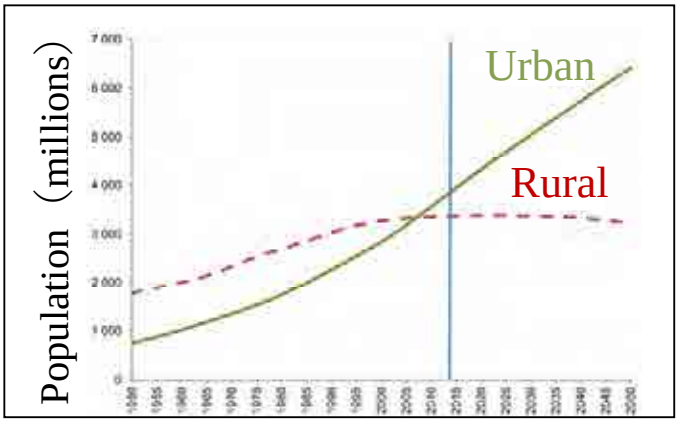
Most of the countries follow the population size and density.
For example,
Denmark follow 250 person /km^2,
USA : 2500 person/km^2,
India : 5000 person/km^2.

How does the United Nations define urban area?

The United Nations defines an area that meets the following conditions as an urban area.

1. 50,000 or more inhabitants living there
2. 60 percent or more of the houses located in its main area
3. 60 percent or more of the population（including their dependents）engaged in manufacturing, trade or other urban type of business.

Pattern and trend of urbanization in the world



Trends in urban and rural populations from 1950-2050（Source : United Nations, World Urbanization Prospectus 2014）

Currently, many countries are already urbanized

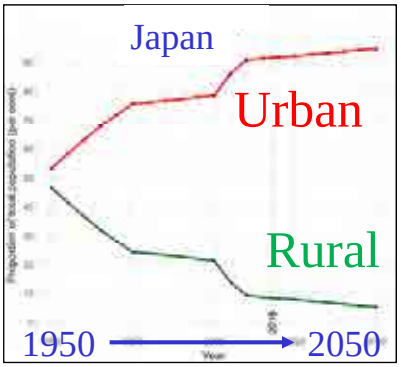
If this graph is represented by a map…

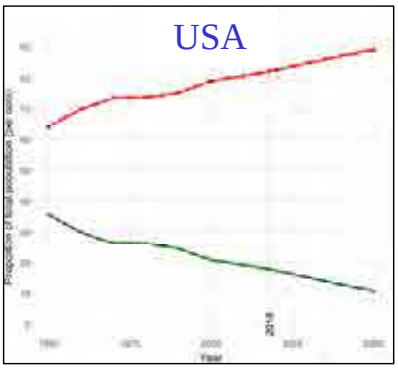
1950 2018 2050

Majority Rural area

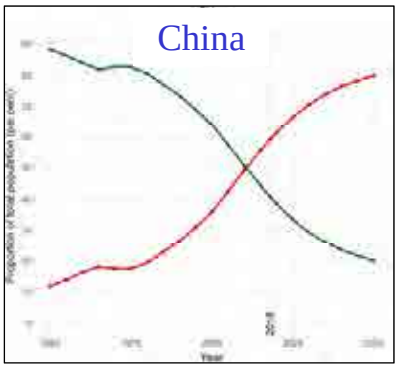
Majority Urban area

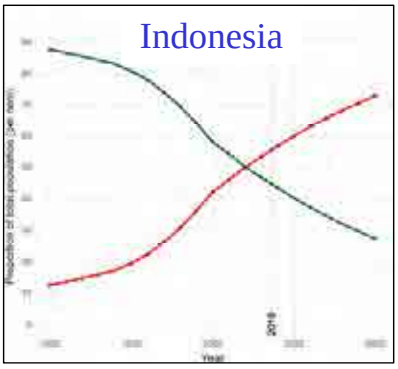
Percentage of rural and urban population in different countries

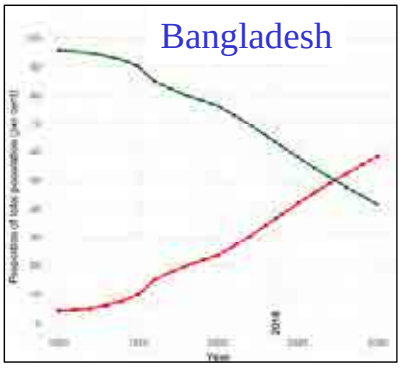




A clear difference on urbanization between developed and developing countries is acknowledged.

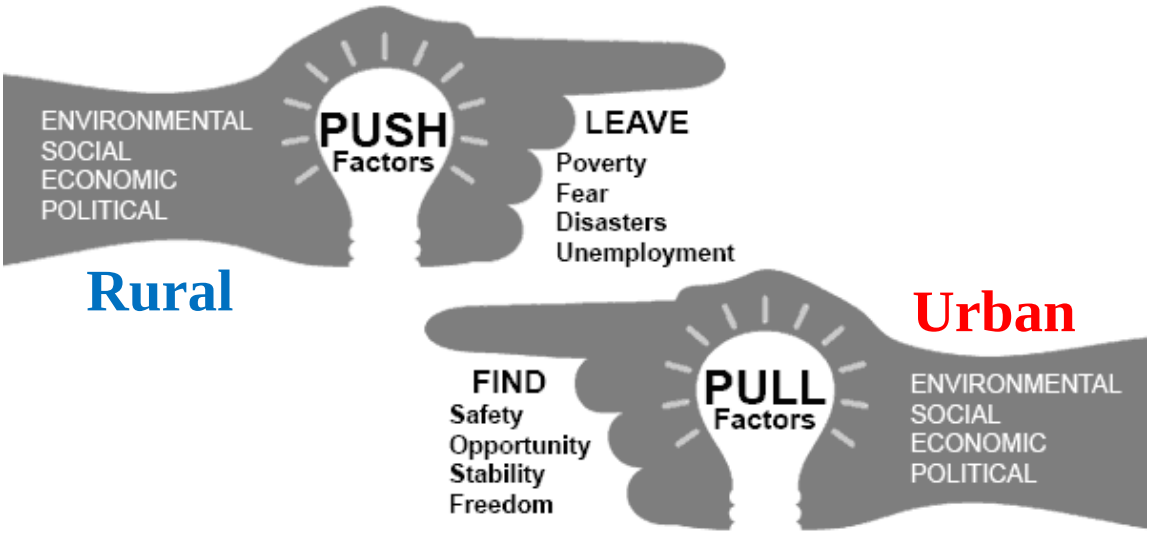






Percentage of Population, 1950-2050（Source : United Nations）

Why does urbanization happen?



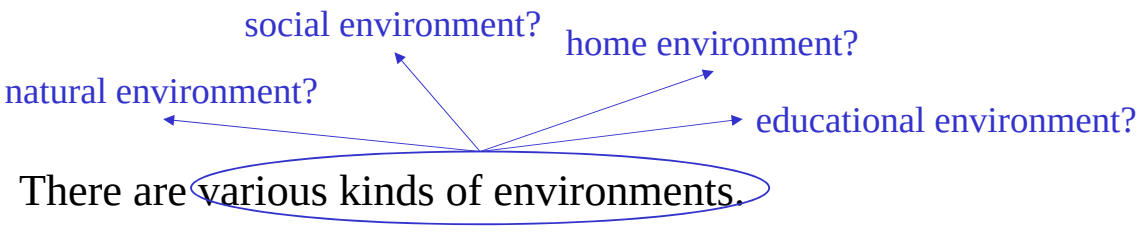
（Source : https://sites.google.com/site/aphumangeographymigration/economic-push-and-pull-factors）

- The majority of those who migrate are young adults. Consequently, the rural area has a population that is aging whereas the urban area has a youthful population.
- The younger population in urban areas has higher birth rate and lower death rate, contributing to the increase of population in urban.

Merits and demerits of urbanization

Merits	Demerits
Better access to public health	Living costs is high
Increase in labor productivity	Transportation cost become high
Better possibilities to boost the economy	Levels of crime increase
Urbanization offers real economic opportunities to people	High level of environmental pollution
Improve technology at a faster rate	Decrease of green environment
Good communication system	Short of food security
Create job opportunity	Limiting housing facilities

What is the environment in our presentation?



- There are various kinds of environments.
- However, in our presentation we assume the environment including society where people can live comfortably.
- So on this slide, let's think about the influence of urbanization and rural population decrease on the environment where humans live.

Influence of rural population decrease on environment

Negative Influence

- **Deterioration of energy efficiency**

- As the rural population decrease, facilities like supermarkets and hospitals rural is likely to be disappeared.
- Then people must travel long distances to go to hospital or supermarket.
- Energy consumption per capita becomes high.

→ lead to low energy efficiency

- **Increase of disaster**

With rural population decrease, management of forests become unable in some countries like Japan.

→ increase the possibility of disasters like landslides

Positive Influence

- **Land recovery**

Land has been degraded due to humans activities

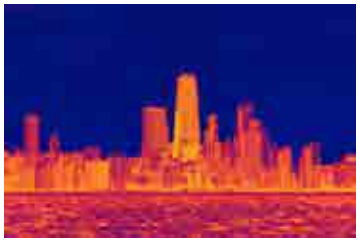
→ give land an opportunity for rebirth

Influences of urbanization on environment

Negative Influence

Air pollution
(https://natgeo.nikkeibp.co.jp/atcl/news/18/090400390/)

Water pollution
(https://www.indiacelebrating.com/environmental-issues/water-pollution/)



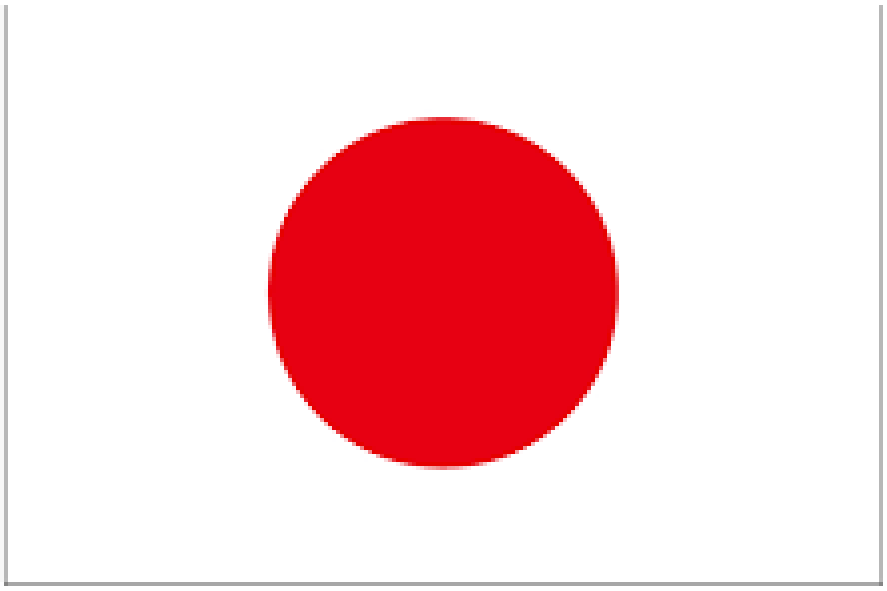
Heat island phenomenon
(https://www.cleantechloops.com/urban-heat-island-effect/)

Positive Influence

Improvement of energy efficiency

- As the population concentrates, people living there will not have to travel long distances.
- Also easy to manage facilities like wastewater treatment etc.

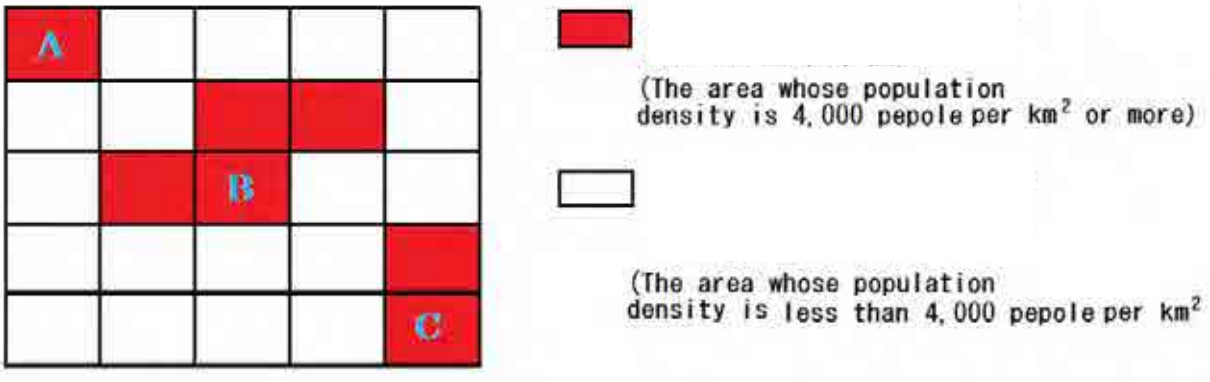
Concrete example -in case of Japan



Definition of urban area in Japan

- **DID (Densely inhabited Districts) – Indicator for urban areas in Japan**

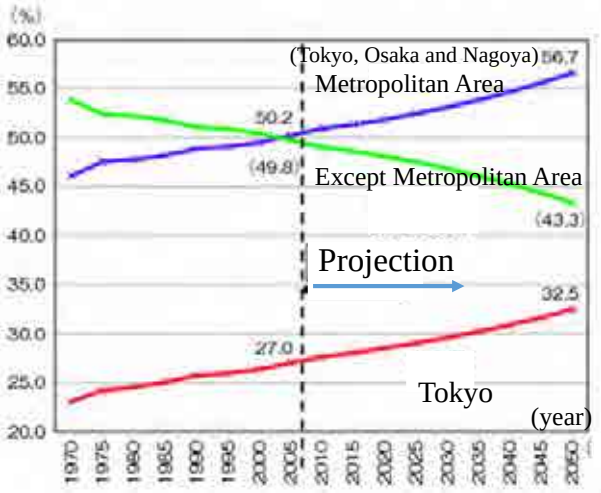
- Total population is 5,000 people per km^2 or more.
- Population density of adjacent areas is 4,000 people per km^2 or more



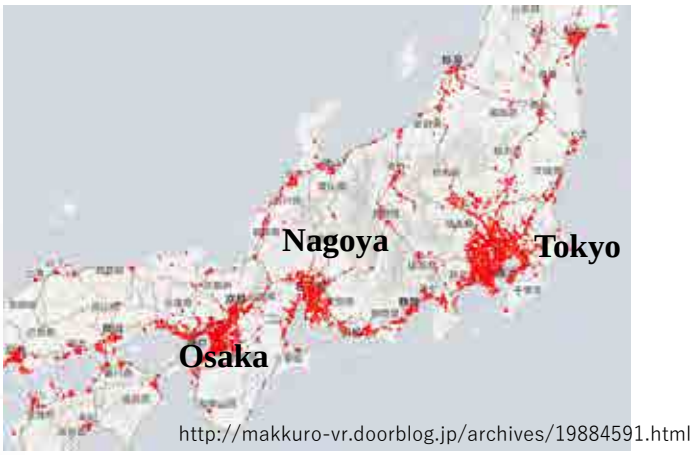
How to define DID (Wikipedia)

Rural population decrease and urbanization in Japan

- Current situation



http://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h24/html/nc112130.html



Urbanized areas in Japan

- More than 50% of total population lives in metropolitan areas (Tokyo, Nagoya, Osaka)
- In 2050, more than 30% of total populations will lives in Tokyo

Environmental conditions in the past time of Japan

High economic growth period in (1954-1973)

http://blog.livedoor.jp/blog_de_blog/archives/51911485.html

Air pollution

https://www.kawasaki-gi.jp/gi-1-2/gi-1-2-2/

Water pollution

http://www.log-osaka.jp/history/vol15/hst_vol15_3.html

Traffic problem

- In high economic growth period in Japan, there were many environmental problems.
- Human health was affected by environmental problems in that period.

Present environmental conditions in Japan

http://www.yokkaichi-port.or.jp/ut14/

Air

https://matome.naver.jp/odai/2139981624317405101/21400075146989325 03

Water

https://road.infobuild.jp/todo23/

Traffic

- There are still problems of environment in Japan, but not so serious.
- Due to the introduction of air filtration process in industries, air quality is being relatively good.
- We can get clean water from anywhere in Japan.
- Transportation system is also in good condition.

Japan is going to next Phase

Influence of rural population decrease in Japan

Next phase

- Most of the people in Japan lives in urban areas.
- Japan is facing the decreasing trend of total population.
- Super aging society is progressing.

- More and more people in rural areas will migrate to urban areas.
- People will not be able to maintain the public services such as hospital, school, transportation, water treatment facilities in rural areas.

Negative influence on environment in rural areas in Japan

Managed and not managed rural areas

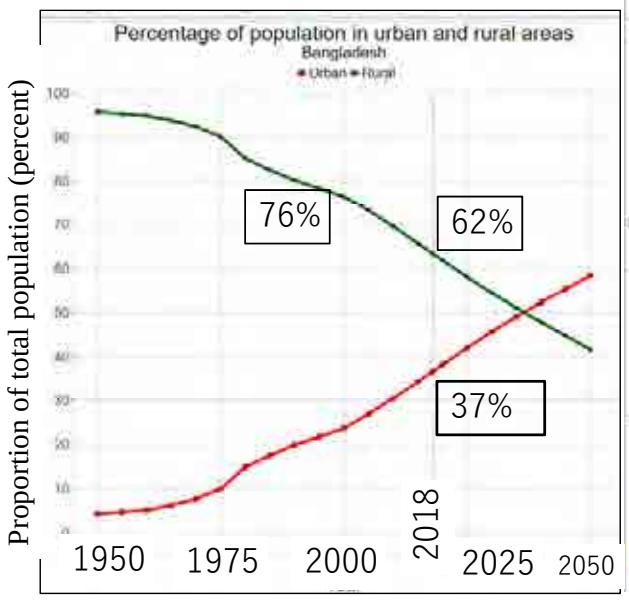
<u>With decrease in rural population</u>

- Ecosystem such as paddy field, forest etc. will be hampered.
- Multiple functions that related to the ecosystem will also be hampered.
- Natural disaster such as flood, landslide will occur due to hindering the multiple function of ecosystem.

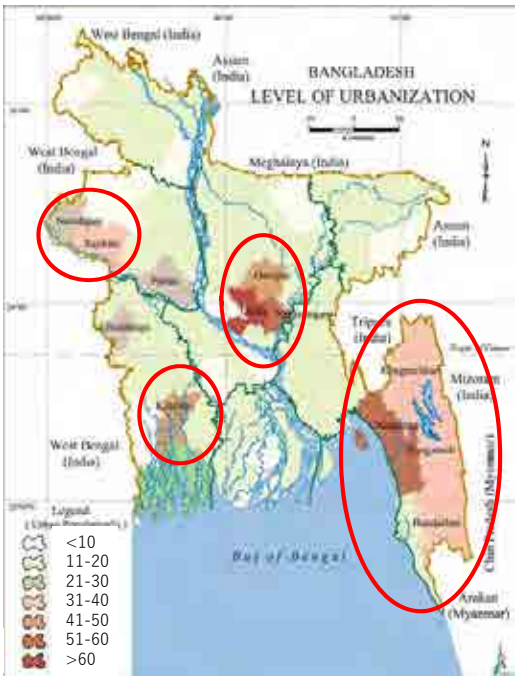
Concrete example -in case of Bangladesh

Rural population decrease and urbanization in Bangladesh

- Current situation



Source: UN Report



Source: Banglapedia

- Majorities of the urban people are living in the largest four cities: Dhaka, Chittagong, Khulna and Rajshahi.

Definition of urban area in Bangladesh

- Standard for urban area was not uniform in all the censuses Bangladesh.
- Between 1901-1974, Paurasabha (municipalities or Shahar (town) committee or cantonment area
- But, in the 1981, 1991, 2001 and 2011 censuses, it was changed.
- In 2011 Census Report, urban areas were defined where,
  - **Amenities** like metalled roads, communication facilities, electricity, gas, water supply, sewerage, sanitation, etc. usually exist.
  - **Densely populated** and people are **non-agricultural**.
  - Where **community system** is well-developed.

Source: http://www.sanei-network.net/uploads/research/sustainable-urbanization-in-bangladesh-delving-into-the-urbanization-growth-poverty-interlinkages1464584088.pdf

Definition of urban area in Bangladesh

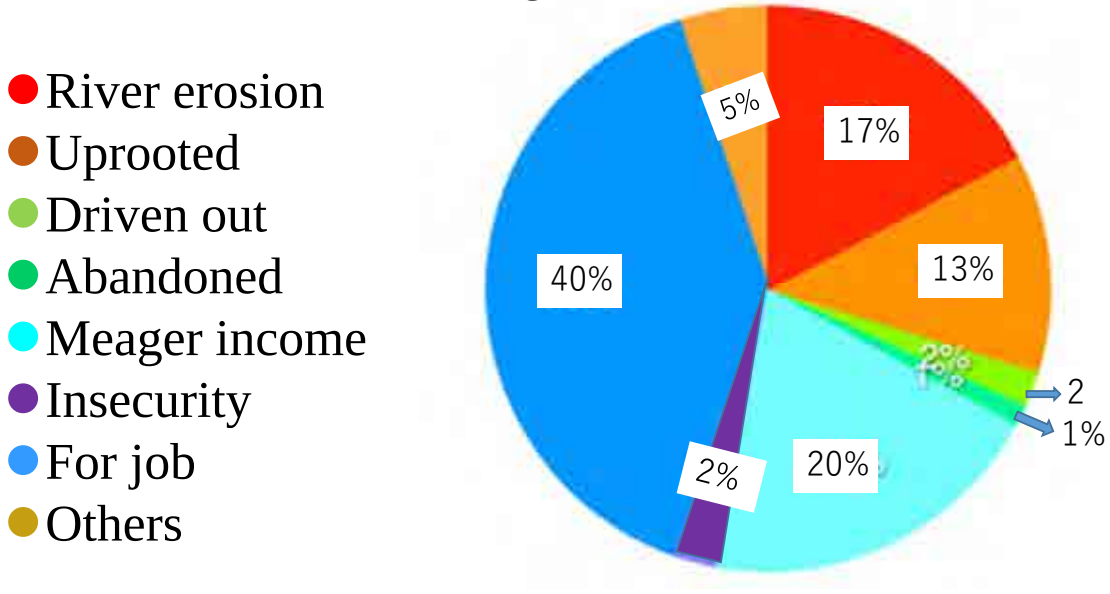
- The urban system consisted of 522 urban center.
- Urban areas are classified into six categories according to their functions and sizes.

1. **Mega City:** It is metropolitan area having **population 5 millions or more.**
2. **City Corporation:** It includes city corporations incorporated and administered by the Ministry of Local Government.
3. **Paurashava/Municipality Area (PSA):** It includes paurashavas incorporated and administered by local government.
4. **City :** Population 1,00,000 and above
5. **Other Urban Area (OUA):** It includes the upazila headquarters which are not paurashavas.
6. **Town :** Population less than 1,00,000

Source: Population census of Bangladesh, 2011

Why rural people are decreasing and heading to urban area in Bangladesh?

- Reasons for decreasing rural population
  - In the case of migration to Dhaka



https://dhakmegacity.weebly.com/push-and-pull-factors.html

Overall effects of urbanization in Bangladesh

1. Transportation problem
2. Housing problem
3. Environment pollution
4. Imbalanced administrative development
5. Over population problem

Housing problem

http://archive.thedailystar.net/newDesign/cache/cached-news-details-262229.html

Transportation problem

https://www.amadershomoy.com/bn/2018/08/01/627878.htm

Over population problem

https://pl-vision.com/wd/eid+2018+bangladesh

Environmental effects of urbanization in Bangladesh

Water Pollution

- Due to urbanization, number of industries are drastically increasing in Bangladesh
- Most of the industries are dumping their toxic effluents into neighboring water bodies and rivers.
- Huge amount of garbage comes from slums area.
- Household waste material

https://www.daily-bangladesh.com/english/Dhaka-rivers-polluted-WASA-moves-to-supply-water-from-Meghna/11707

Water logging

- Unplanned sewerage system

https://www.clickittefaq.com/dhaka-drowns-clogged-rainwater/

Environmental effects of urbanization in Bangladesh

Air pollution

- According to the Department of Environment, the density of airborne particulate matter reaches **463** micrograms per cubic meter.

https://en.prothomalo.com/environment/news/167721/Bangladesh-loses-1pc-GDP-for-air-pollution-WB

Climate change

- Decreasing forest
- Temperature is increasing day by day
- Natural disaster like flood occurred frequently

Past

http://theglobalhistory.blogspot.com/2010/08/history-of-dhaka.html

present

https://www.flickr.com/photos/monz/6181277238

Conclusions

- Urbanization is good for the economic development of a country specially for developing countries. But the environment is greatly affected by the urbanization.
- In Japan, environmental effect of rural people decrease is greater than the effect of urbanization.
- For developing countries like Bangladesh, improved urban environmental management is very much important.
- Conclusively, negative effect of urbanization on environment is very much higher than the positive effect in all over the world.

Discussion Topics

- How to increase rural population in your country?
- What will happen if the world is being 100% urbanized?

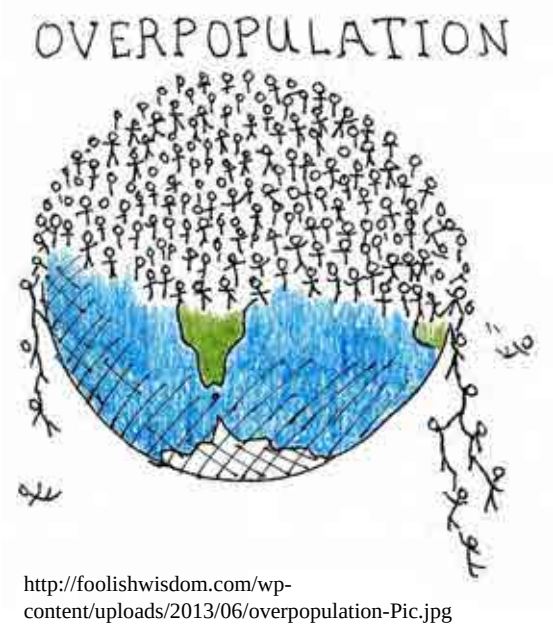
Overpopulation in Asian Countries

YUTO ITO (M2)
BHUIYAN MST AFRIN AKTER (M1)
WANG SIYI (M1)

Contents

- **What is overpopulation**
- **Population status in Asia**
- **Overpopulation in China, India and Bangladesh**
  - ✓ **Current situation**
  - ✓ **Causes**
  - ✓ **Effects**
  - ✓ **Solutions**
- **Conclusion**
- **Discuss topics**

What is overpopulation?



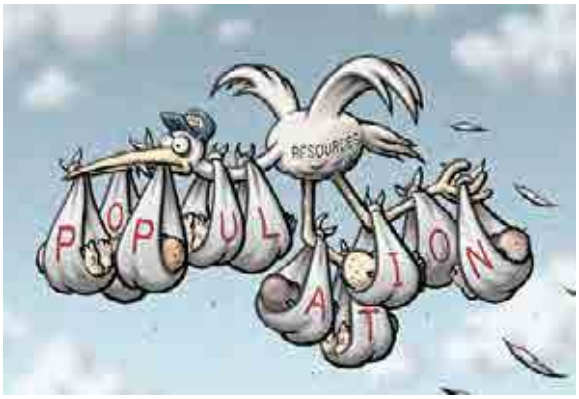
http://foolishwisdom.com/wp-content/uploads/2013/06/overpopulation-Pic.jpg

Overpopulation occurs when a species' population exceeds the carrying capacity of its ecological niche.

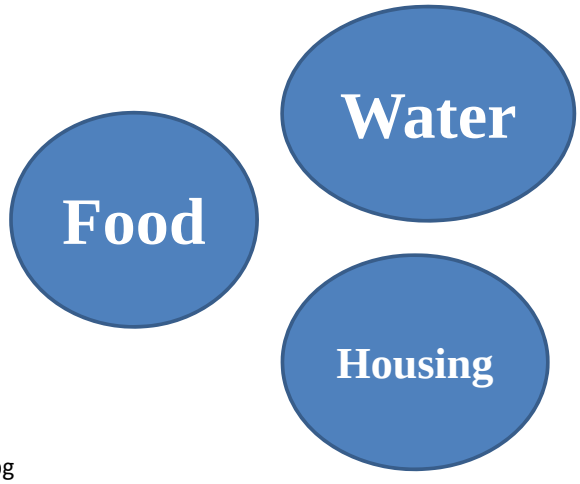
Moreover, it means that if there are too many people in the same habitat, people are limiting available resources to survive.

What is overpopulation

Overpopulation can be resulted from an increase in births (fertility rate), a decline in the mortality rate, an increase in immigration, or an unsustainable biome and depletion of resources. To be brief, the overpopulation is caused by the out-off-balance between individual number and related resources.



http://mindprod.com/image/environment/overpopulation.jpg



Adverse effects of overpopulation:
Society and economy, Natural resources, Environment

World population situation

TOP 20 LARGEST COUNTRIES BY POPULATION (LIVE) (2018/11/07)

1	China	1,417,002,712	11	Japan	127,079,909
2	India	1,359,341,023	12	Ethiopia	108,459,772
3	U.S.A.	327,585,147	13	Philippines	107,080,525
4	Indonesia	267,791,764	14	Egypt	100,027,227
5	Brazil	211,428,433	15	Vietnam	96,828,877
6	Pakistan	202,171,899	16	D.R. Congo	84,966,458
7	Nigeria	197,667,325	17	Germany	82,356,821
8	Bangladesh	166,971,868	18	Turkey	82,334,591
9	Russia	143,955,869	19	Iran	82,313,535
10	Mexico	131,327,097	20	Thailand	69,234,666

World Population by Region

#	Region	Population (2018)
1	Asia	4,545,133,094
2	Africa	1,287,920,518
3	Europe	742,648,010
4	Latin America and the Caribbean	652,012,001
5	Northern America	363,844,490
6	Oceania	41,261,212

The United Nations projects world population to reach **10 billion** in the year 2056.

1804 - 2011 (**207 years**): from 1 billion to 7 billion

1804	1850	1900	1930	1950	1960	1974	1980	1987	1999	2011	2020	2023	2030	2037	2045	2055	2100
1	1.2	1.6	2	2.55	3	4	4.5	5	6	7	7.8	8	8.5	9	9.5	10	11.2

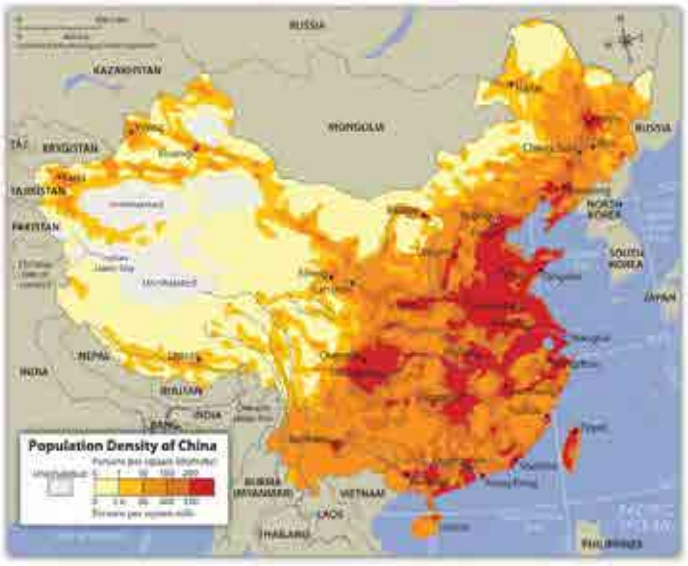
http://www.worldometers.info/world-population/

Population density map

There is large population density In India, Bangladesh and the eastern coastal areas of China, so we will take the three countries as examples to introduce the causes, effects and solutions related to our overpopulation issues.

http://www.worldometers.info/world-population/#density

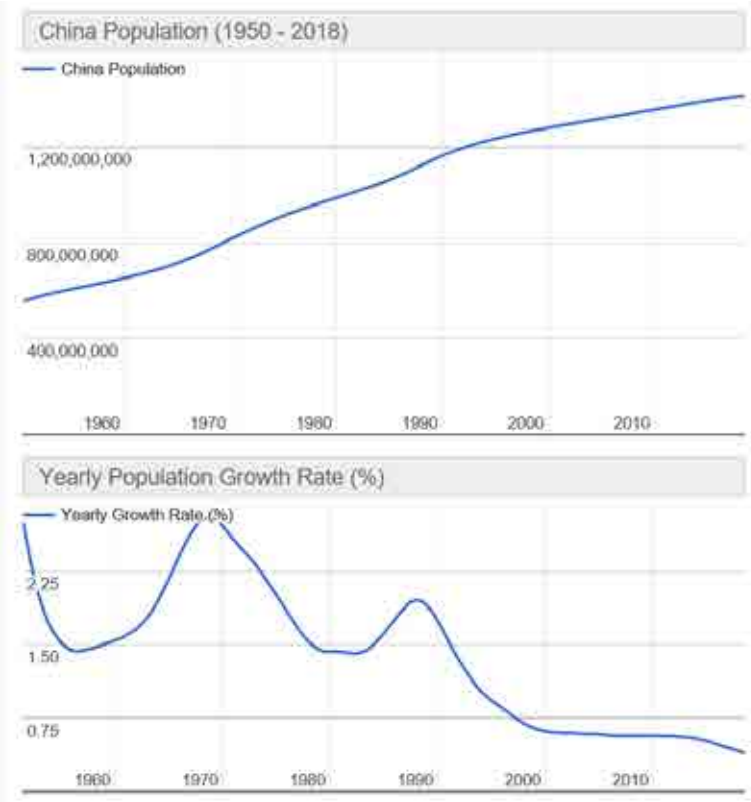
Population status of China



China population density map 2018

- Population (2018): 1,417,002,712.
- Share of world population: 18.54%.
- Ranking: number 1
- Population density: 151 (People/km^2)

Population trend in China



Census of population in 2018

- Births: **17,230,000 people**
- Birth rate: **12.43 per thousand**.
- Mortality: **9,860,000 people**
- Mortality rate: **7.11 per thousand**.
- Natural population growth rate: **5.32 per thousand**.

Causes of overpopulation in China

http://u.thsi.cn/fileupload/data/Input/2013/03/11/c76562d066dab972a1a955772adcb267.jpg

http://img2.3png.com/a8d47cdb0dd72921b46cd5a737f1d555b421.png

https://img0.utuku.china.com/381x0/news/20170612/df10924f-25df-4a4e-84be-e7ad1df4952f.jpg

- **High population base**: from 1949 to 1953 encourage people to give birth and limit contraception and abortion.
- **Traditional view**: many children and many grandchildren represent the prosperity of the family.
- **Feudal thought**: viewing sons as better than daughters, because they need labor to do the farm work.

Adverse effects of overpopulation in China

http://wemedia.ifeng.com/66423380/wemedia.shtml(May 29, 2007)

- **Water pollution**

The population density of Taihu Lake area has reached about 1000 people/ km^2, and with the acceleration of urbanization, the rapid development of industrial economy and the increase of external population, the discharge of urban industrial and domestic sewage increased rapidly, which led to the outbreak of eutrophication in Taihu Lake.

Water treatment is needed before discharge.

Adverse effects of overpopulation in China

https://www.vcg.com/creative/815857810

The Imperial Palace under the haze

http://www.tuniu.com/g200/tipnews-5961/

- **Air pollution**

In Beijing, haze is a very serious problem，and the picture shows the air quality index of Bejing on Nov 14, 2018.

http://www.86pm25.com/city/beijing.html

From left to right means the air quality from good to severe pollution, and on Nov 14, 2018, Beijing's air quality is under heavy pollution.

And the haze was mainly caused by vehicle exhaust, industrial pollution, Coal-fired heating.

➡ call for using environmentally friendly vehicles, treat the industrial gas emissions and use clean energy.

Adverse effects of overpopulation in China

- **Food supply is not sufficient**

With large population base, the grain produced in China can not feed all the Chinese people. <u>We need to import a lot of food.</u>

In 2017, China imported 13.62 million tons of grain, while rice and soybean imports remained the world's top level and continued to increase.

http://www.agrogene.cn/info-4673.shtml

➡ **<u>Need to promote mechanization and improve production efficiency</u>**

How to deal with overpopulation

In terms of population: continue to carry out its family planning policy (late marriage, late childbearing, eugenics and scientific nurture)

to control population growth and improve the quality of the population.

In terms of resources: economize resources and improve the utilization ratio of resources.

- Optimize energy consumption structure.
- Improve the technical level of the oil and natural gas industry, coal industry, hydropower stations and nuclear power stations.

In terms of environment:

- Make the population distribution rationally.
- Encourage green driver like bicycle sharing, car sharing, electric bus...
- Advanced environmental protection industries like water treatment, air monitoring and so on.

Population status of India

2018
1.1 billon people

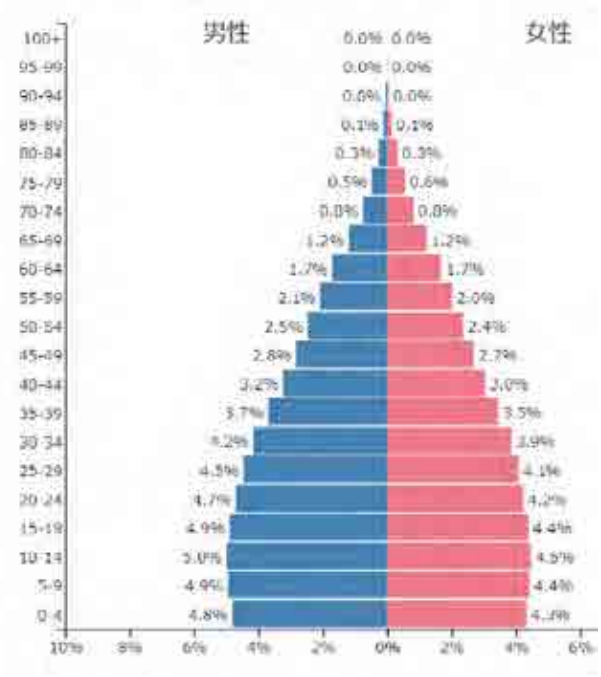
2026
1.4 billion people

https://www.bing.com

- **Population density is higher than 2.5 times that of China**
- **Second largest economic growth after China (economic growth rate 9.0%)**
- **Hundreds of millions of poor people will be born**

Causes of overpopulation in India

2016



https://india-ryugaku.jp/india-population/

Population

- Many young generation population
- More than half of the population is under 25 years old

Good point

- The labor force population increases

Causes of overpopulation in India

https://www.bing.com/images

Poverty

- Economic instability of 500 million poor in India
- Make children make money

https://www.bing.com/images

Education

- There is no sex education

Adverse effects of overpopulation in India

https://www.businessinsider.jp/post-171176

Residence (poor condition)

- 28,200 people live in 1 square meters
- The rent for housing of about 9 square meters is about 400 yen to 600 yen per month

Garbage

- Garbage is a big problem for Mumbai in India
- The amount of garbage in Mumbai is about 9,500 tons per day

https://www.businessinsider.jp/post-171176

Adverse effects of overpopulation in India

https://www.businessinsider.jp/post-171176

Resource

- One fourth of children can not eat anything whole day
- Agricultural wells are starting to dry up
- 600 million people are suffering from water shortage

Traffic

- Traffic jam gets worse
- There is no signal or lane and it is dangerous

https://www.businessinsider.jp/post-171176

Other problems caused by overpopulation

- About 270 million people have no toilet
- Excretes can cause diseases like diarrhea by contact with excreta
- The population of deaths of children under 5 in India accounts for about 21% of the world. The third leading cause of death is diarrhea
- 43% of the toilets constructed by the government have been diverted to warehouses
- Indian thinks that to excrete in the toilet is filthy

Other problems caused by overpopulation

- Air pollution in New Delhi is at the worst level in the world
- Air pollution concentration in New Delhi is three times higher than Beijing
- Children's respiratory illness is increasing
- Air pollution is caused by the rapid increase of diesel vehicles
- More than half of the pollution sources are exhaust gas

How to deal with overpopulation

- Introduction of birth control restraint from 1952
- Improve education level
- Give financial support to couples who will not have children for two years after marriage
- Give financial support to couples who will cut the pipe of children

Population status of Bangladesh

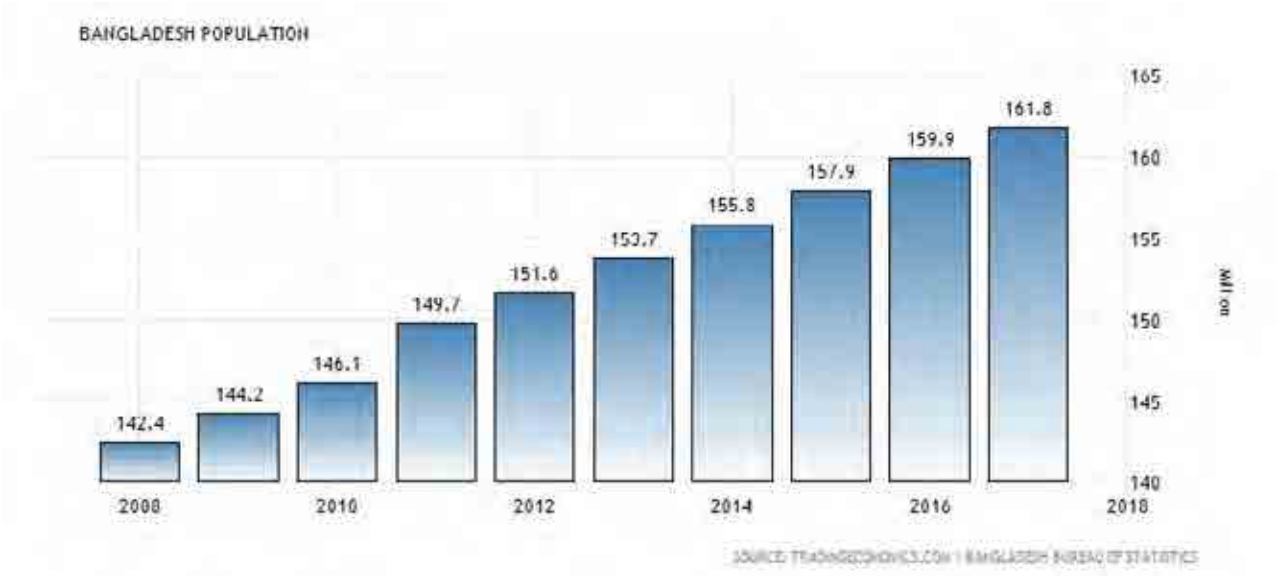
- The current population: 166,734,721.
- It is equivalent to 2.18% of the total world population.
- The population density: 1278 per km^2.

http://pranerbangla.net/2017/05/17/bangladeshs-problem-population/

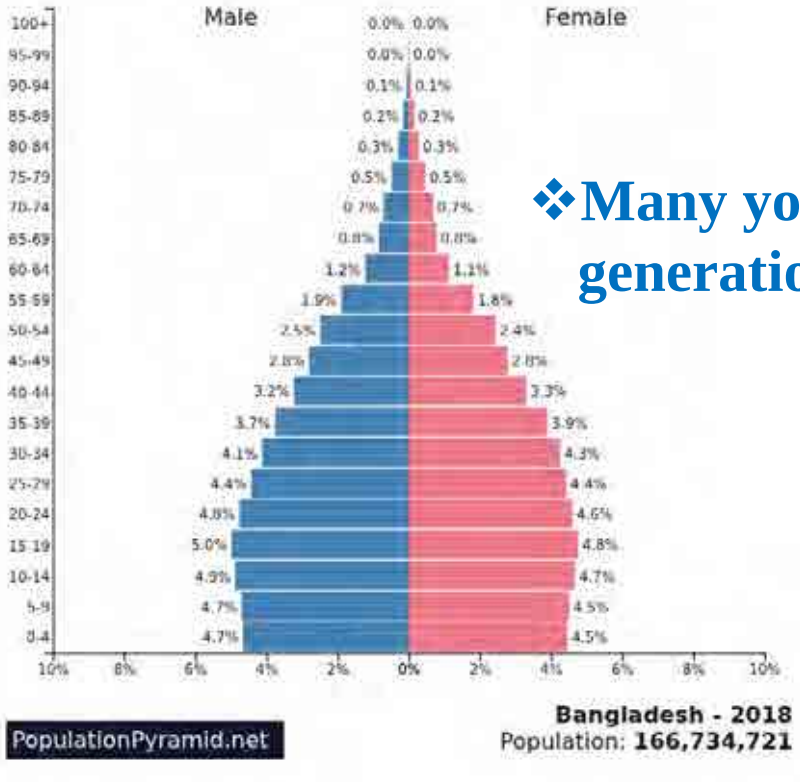
It ranks number 8 in the list of countries by population

Bangladesh's population over ten years

In 2050 the population will be 20 million!!!!



POPULATION STRUCTURE OF BANGLADESH



❖**Many young generation population**

Causes of overpopulation in Bangladesh

Economic factors

Poverty: Large numbers of people who are living under poverty line believe, more children earn more money.

Agricultural economics: Economy of Bangladesh depends on agriculture. For helping in agriculture farmers take more children.

https://www.google.com/search?q=poverty+of+bangladesh&source

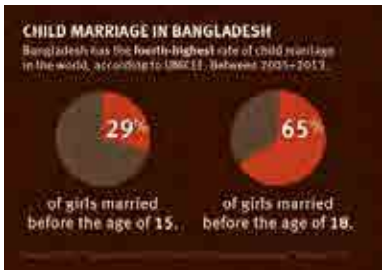
Natural Factors

Climate: The climate of Bangladesh is temperate means neither very cold nor hot.

Configuration of land: Configuration of land and soil of Bangladesh are very favorable to live and agriculture work.

Social Factors

Lack of Education: Education, more importantly the education of women.

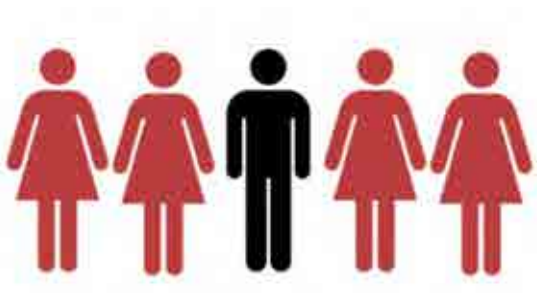


Early marriage: Lead to earlier pregnancies and without the use of contraception, it poses the risk of multiple pregnancies.

Polygamy: Polygamy and civil polygamous marriages are legal in Bangladesh

Social and religious superstitions

Lack of willingness to use contraceptives



https://themuslimtimes.info/2017/10/23/polygamy-in-islam-what-it-means/comment-page-2/

Adverse effects of overpopulation in Bangladesh

Traffic

Congestion in Dhaka eats up 3.2 million working hours per day.

https://www.google.com/search?q=traffic+jam+in+dhaka&source

- The last 10 years, average traffic speed has dropped from 21 km to 7 km (hour).

https://www.google.com/search?q=housing+problem+in+dhaka+city&source

Residence

- About 23,234 people live per square kilometer.
- About 57% of the middle class and lower income people cannot afford to buy houses in Dhaka.

Environment pollution

https://problemsofbd.wordpress.com/2017/11/15/environmental-problems-issues-in-bangladesh/

https://www.dhakatribune.com/bangladesh/environment/2018/05/04

- There are no systematic way for garbage disposal.
- Dust problem is very high.
- **According to World Bank, 0.234 million people died in Bangladesh in 2015 linked to environmental pollution, of which 80,000 people in urban areas.**

Educational problem

- Shortage of educational institution
- Shortage of qualified teachers

http://www.irinnews.org/report/82868/bangladesh

How to deal with overpopulation

Bangladesh Government has Taken Some Measurements…..

Better education:

✓ Specially for women in Bangladesh education upto college is free.

✓ Provide Book free of cost to all and stipen to the poor student.

Family planning: Made satelite clinic in more areas to make the people aware and family planning service available.

Preventing early marriages: More strict laws are expected.

Stopping early pregnancies: If girls start having children from an early age, they are more likely to have more children because they will be in their fertile years for longer.

CONCLUSIONS

- Overpopulation is a big problem in Asia.
- The situation is most serious in China, India and Bangladesh.
- Many reasons work behind it. The main reasons are poverty, lack of education, traditional view e.t.c
- There are many adverse effect of overpopulation. Major effects are traffic, housing problem, shortage of resource, environmental pollution and so on.
- To deal with this problem we can take some necessary steps like, Family planning, Better education, Financial support and so on.

DISCUSSION TOPICS

1. Can you image any advantages of overpopulation in your country?

2. What will be happened if there are 14 billion people on the earth?

2018.5.25

Various Problems Induced by Land Subsidence and the Resolutions

Takumi Sato (M2), Haruki Kanayama (M1),
Suozhu (D2), Nayla Majeda Alfarafisa (D1)

Outline

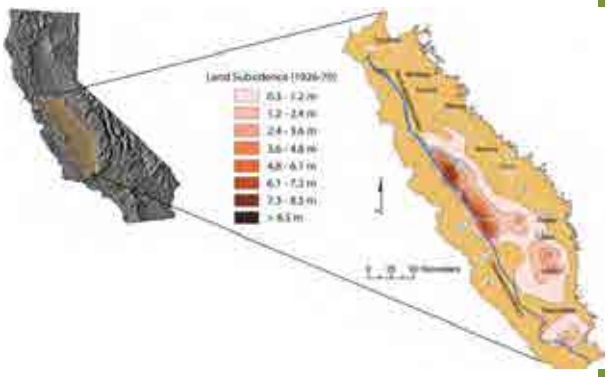
- Definition
- Causes of Land Subsidence
- Impacts of Land Subsidence
- Methods for Monitoring Land Subsidence
- Land Subsidence in Japan
- Land Subsidence in Indonesia
- Land Subsidence in China
- Countermeasures
- Conclusions

DEFINITION OF LAND SUBSIDENCE

What Is Land Subsidence?

- Land subsidence is the gradual settling or sudden **sinking of land** with respect to surrounding terrain or sea level (Hu et al., 2004)
- Land subsidence includes both gentle **downwarping and the sudden sinking** of discrete segments of the ground surface. Displacement is principally downward, though associated horizontal deformation often has significant damaging effects (Burbey, 2011)

Land Subsidence in San Joaquin Valley



Land Subsidence in San Joaquin Valley, California, USA

San Joaquin valley is one of the most productive agricultural regions in USA. Groundwater extraction was estimated as a main cause of land subsidence in San Joaquin Valley.

https://ca.water.usgs.gov/land_subsidence/
http://cdoovision.com/central-valley-ca-on-us-map/central-valley-ca-on-us-map-subsidence1926-70/

CAUSES OF LAND SUBSIDENCE

Main Causes of Land Subsidence

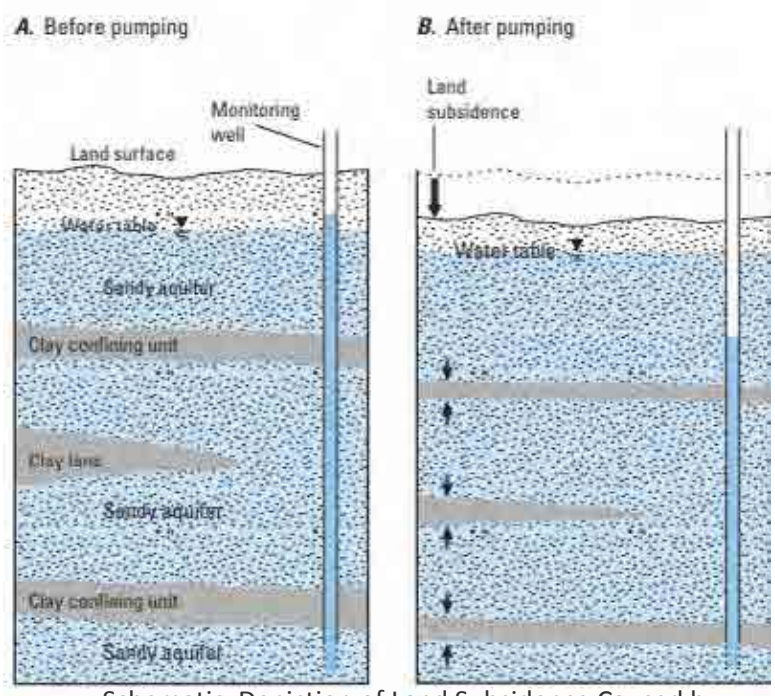
- Groundwater Extraction
- Oil or Natural Gas Extraction
- Natural Disaster (Earthquake)
- Building Load

Groundwater Extraction

It is estimated 80% serious land subsidence was caused by excessive groundwater pumping.

Soil stress changes when groundwater is pumped out, which will promote silt and clay's compaction.

Thus, the total volume of the silt and clay is reduced, resulting in the lowering of the surface.



Schematic Depiction of Land Subsidence Caused by Groundwater Extraction

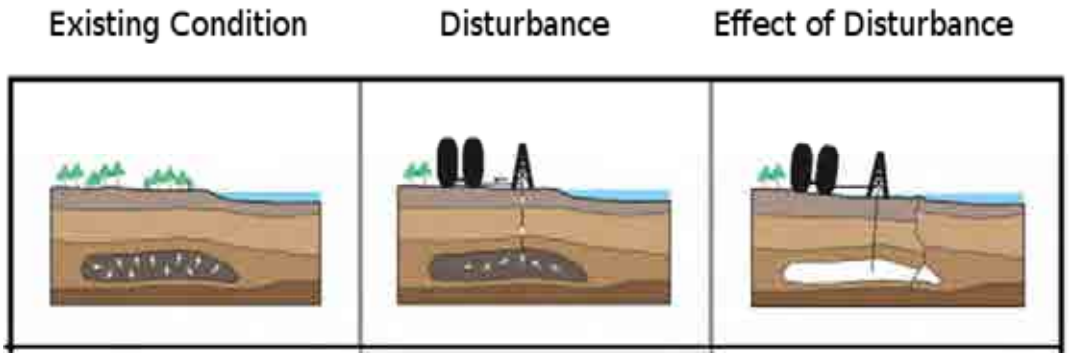
https://pubs.usgs.gov/circ/1392/pdf/circ1392.pdf

Oil or Natural Gas Extraction

When natural gas is extracted from a natural gas field, the initial pressure in the field will drop over the years.

The gas molecules help support the soil layers above the field.

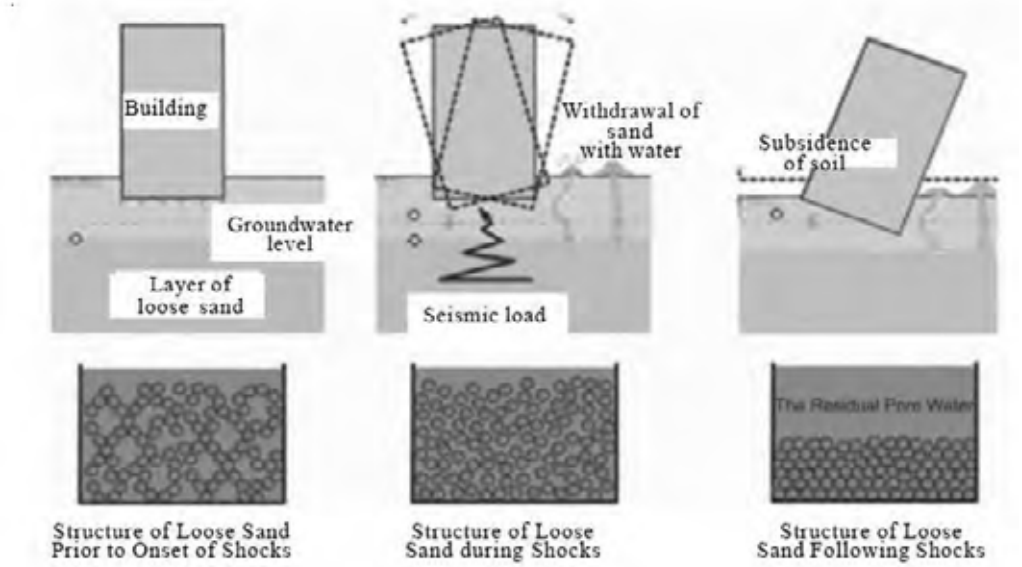
When the gas is extracted, the overburden pressure sediment compacts and may lead to subsidence of the ground level.



Schematic Depiction of Land Subsidence Caused by Oil and Gas Extraction Activity

https://en.wikipedia.org/wiki/Subsidence

Earthquake

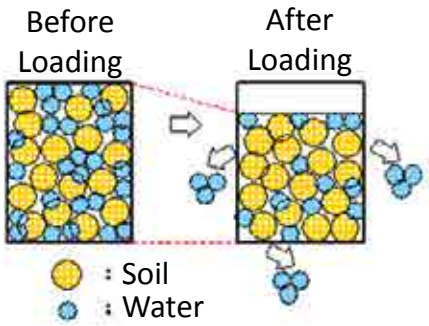


Schematic Depiction of Intensive Liquefaction of Saturated Sandy Soil

Soil liquefaction describes a phenomenon whereby a saturated or partially saturated soil substantially loses strength and stiffness in response to an applied stress, usually earthquake shaking or other sudden change in stress condition, causing it to behave like a liquid.

https://link.springer.com/article/10.1007/s10553-017-0856-9

Building Load



Schematic Depiction of Land Subsidence Caused by Building Load

Soil with clay and silt composition will possess high concentration of water. Building load will stress the soil causing the water running out from the soil and the total volume of the soil was decreased.

https://www.kg-net2005.jp/study/saigai-to-taisaku/jibanchinka.html
https://blogs.ntu.edu.sg/hp331-2015-19/reasons-for-the-sinking/

IMPACTS OF LAND SUBSIDENCE

Several Impacts of Land Subsidence

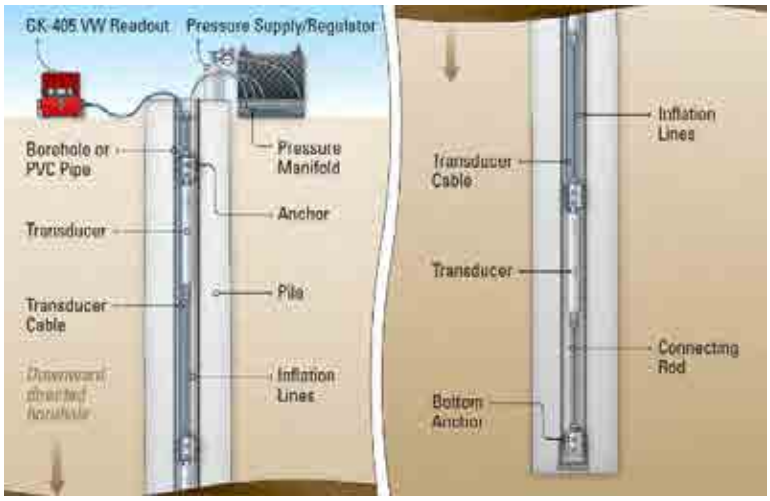
- Damage to buildings
- Damage to Lifeline facilities (water and gas pipes etc.)
- More High-risk of tsunami and floods due to declined embankment capacity
- Economic loss
- Health problems
- Loss of soil fertility
- Loss of fresh water availability
- Threat of food scarcity

Damage to Buildings (above) and Damage by Floods (below), as Results Affected by Land Subsidence

https://en.wikipedia.org/wiki/Subsidence
http://www.higashi-nagasaki.com/e2012/E01-2012_108_2.html

LAND SUBSIDENCE MONITORING

Methods for Monitoring Land Subsidence



Vertical Extensometer Principle

Vertical Extensometer

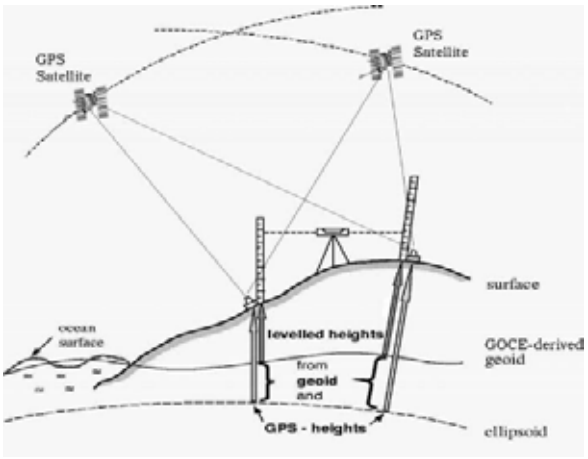
- This instrument can measure the relative depth between the bottom of the borehole and the ground surface
- Suitable for monitoring in small scale area
- Measurement accuracy is ±0.01 mm

https://bditest.com/product/sensors/extensometers/retrievable-extensometer/

Methods for Monitoring Land Subsidence

Leveling

GPS surveying is used to monitor subsidence over greater distances or at a regional scale. Benchmarks or "geodetic stations", are used along a transect, or network. Ground elevations at each benchmark can be obtained within plus or minus one inch of accuracy with GPS surveying. Elevations measured by leveling should be expected to meet an accuracy of at least ±3 mm and monument spacing needs to be planned to achieve that level of accuracy.



GPS Leveling Principle

https://www.researchgate.net/figure/Diagram-showing-the-concept-of-levelling-by-GPS-Differential-GPS-provides-ellipsoidal_fig17_252900643

Methods for Monitoring Land Subsidence

InSAR (Interferometric Synthetic Aperture Radar)

InSAR is a space-borne remote sensing technology that uses changes in satellite radar signals created by interferences on the earth's surface to measure changes in land surface elevation. Results from InSAR will depend on the site's terrain, ground and vegetation conditions, and sources of potential ground disturbance due to cultural interference such as agriculture or construction site grading.

InSAR Principle

https://www.sciencedirect.com/science/article/pii/S0924271615002269#f0005

LAND SUBSIDENCE IN JAPAN

Land Subsidence in Tohoku, Chiba, Tokyo and Niigata Areas

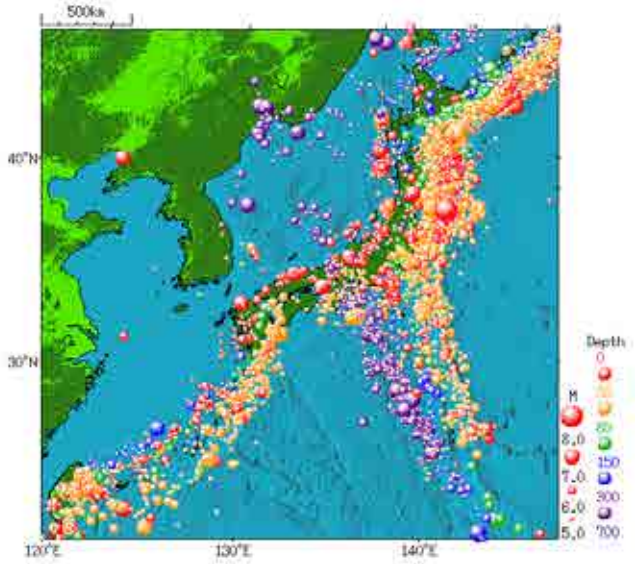
Map of Japan

https://matome.naver.jp/odai/2148393354184621901/2148409463660534403

Causes of Land Subsidence in Japan

- Earthquake (Tohoku, Chiba)
- Groundwater Extraction(Tokyo, Niigata)
- Building Load
- Oil/ Natural Gas Extraction

Earthquake Frequency Around Japan



Spatial Distribution of Earthquake Occurred Around Japan (1960-2011)

Located in one of the most active seismic zones in the world, Japan is frequently struck by earthquakes.

http://www.data.jma.go.jp/svd/eqev/data/jishin/about_eq.html

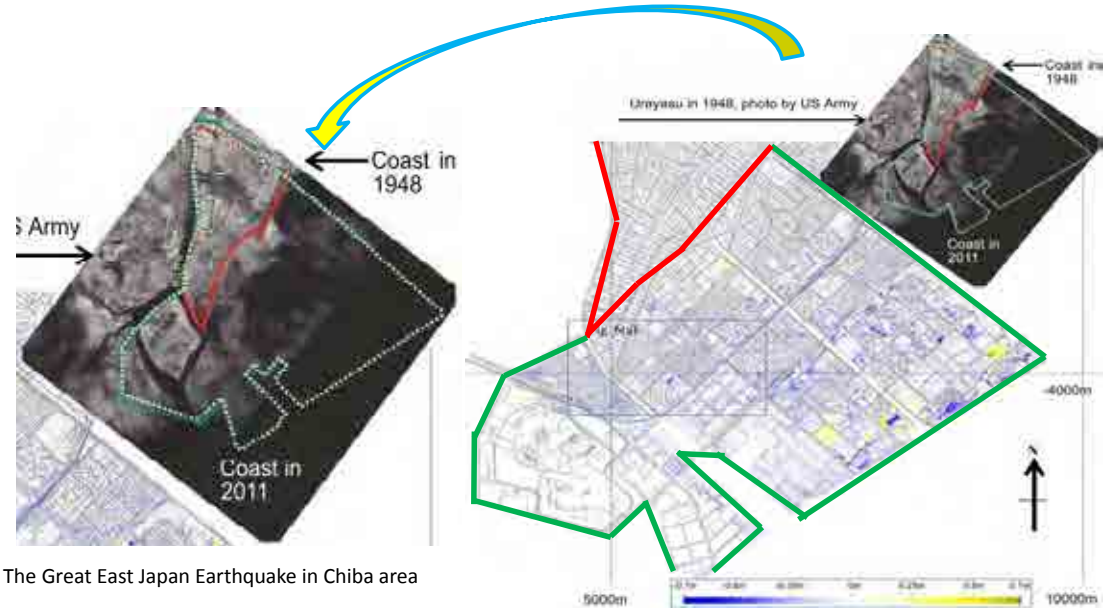
The Great East Japan Earthquake in Tohoku

Great East Japan Earthquake in Tohoku

- According to the Japanese government, the direct **financial damage** from the disaster is estimated to be about **199 billion dollars**.
- The huge earthquake of **Mw** (**9.0**) in Japan caused many kinds of damage that was characterized by a tremendous number over a vast area.
- **Liquefaction caused land subsidence** as well as the tilting of private houses, although there were no resulting casualties.

https://www.sciencedirect.com/science/article/pii/S003808061400078X

The Great East Japan Earthquake in Chiba

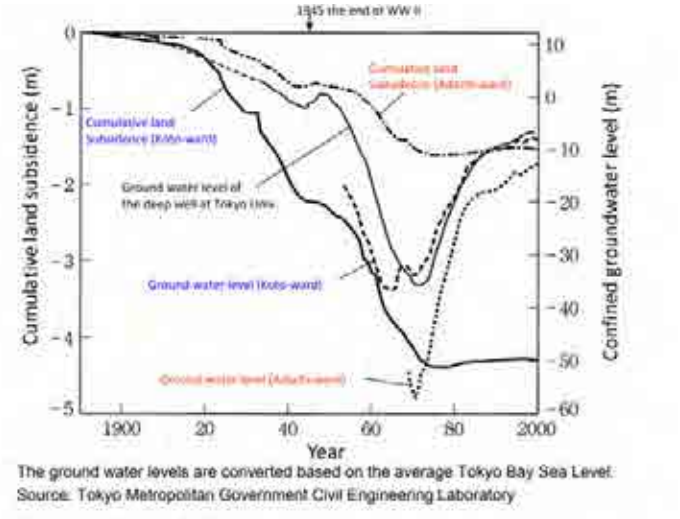


The Great East Japan Earthquake in Chiba area

- Obvious land subsidence occurred in the landfilled area (surrounded by Green line) due to liquefaction.
- Land subsidence only less than 0.1 m was founded in the long-existing natural land (area surrounded by Red line).

https://www.sciencedirect.com/science/article/pii/S0267726113001450

Trend of Groundwater Levels in Tokyo



The ground water levels are converted based on the average Tokyo Bay Sea Level.
Source: Tokyo Metropolitan Government Civil Engineering Laboratory

- Land subsidence in Tokyo lowland started in the 1920s.
- In the 1960s, the groundwater level dropped by an average of 2.5 m/year, and **land subsidence advanced by an average of 10 cm/year**.
- Japan consumed lots of underground water during high-growth period.
- The pumping regulation of 1970s restored the groundwater level, but the subsided land is **not recovered**.

http://www.deltaalliance.org/media/default.aspx/emma/org/10885863/170728+Land+Subsidence+Management+in+Japan+(Web+Page).pdf

Groundwater Extraction for Melting Snow in Niigata

Length of Pipes for Snowmelting in Japan

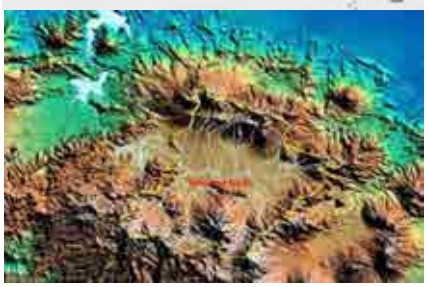
Snowmelting Pipes in Niigata

- Remarkable subsidence due to groundwater extraction has been observed in the southern part of Niigata Prefecture.
- The maximum subsidence amounted to 73 mm/year and the area affected is estimated to be as much as 50 - 60 km^2.
- As Niigata is a thick snow-covered area, a tremendous amount of **groundwater is used for melting snow**. The total discharge of groundwater is 1.26 x 10^3 m^3 /day during winter.

http://hydrologie.org/redbooks/a234/iahs_234_0487.pdf

LAND SUBSIDENCE IN INDONESIA

Land Subsidence in Bandung Basin



Bandung Basin Location

- The Bandung Basin is a large intra-mountain basin surrounded by volcanic highlands, located in West Java province, Indonesia
- The impacts of land subsidence can be seen in several forms, such as crack in buildings, damage of infrastructures (road and bridges), tilting and damaged houses, and increases in flooding inundation areas

Impacts of Land Subsidence

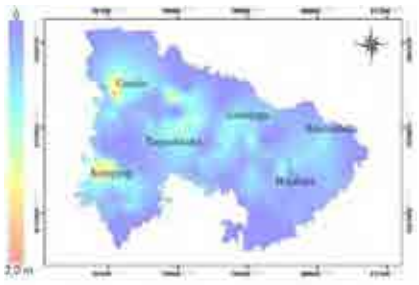
Gumilar *et al*., (2015)

Land Subsidence in Bandung Basin

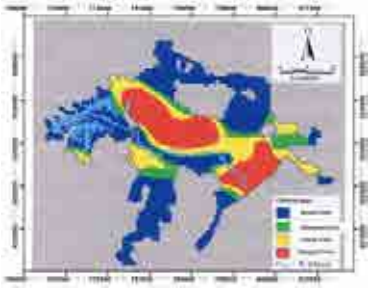
There are 4 main causes of land subsidence in Bandung basin (Gumilar *et al*., 2015):

1. Groundwater Extraction
2. Building Load
3. Natural Compaction
4. Tectonic Activity

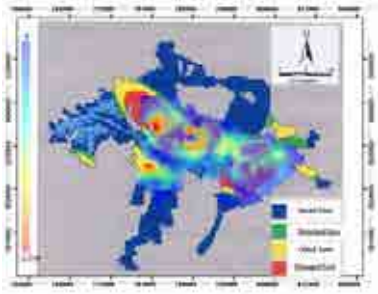
Groundwater Extraction and Land Subsidence in Bandung Basin



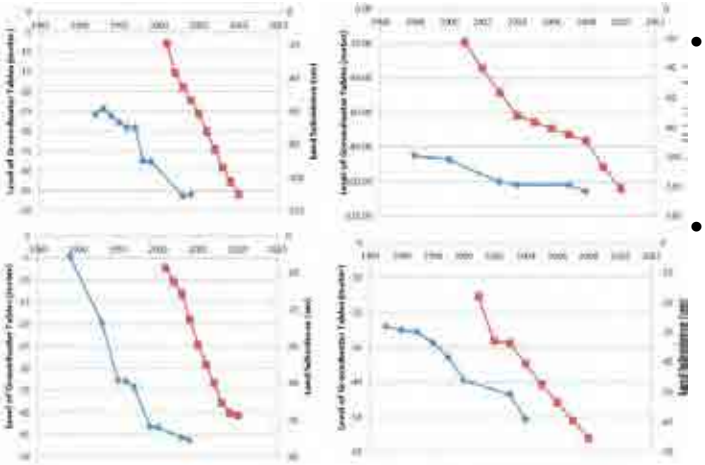
A



B



C

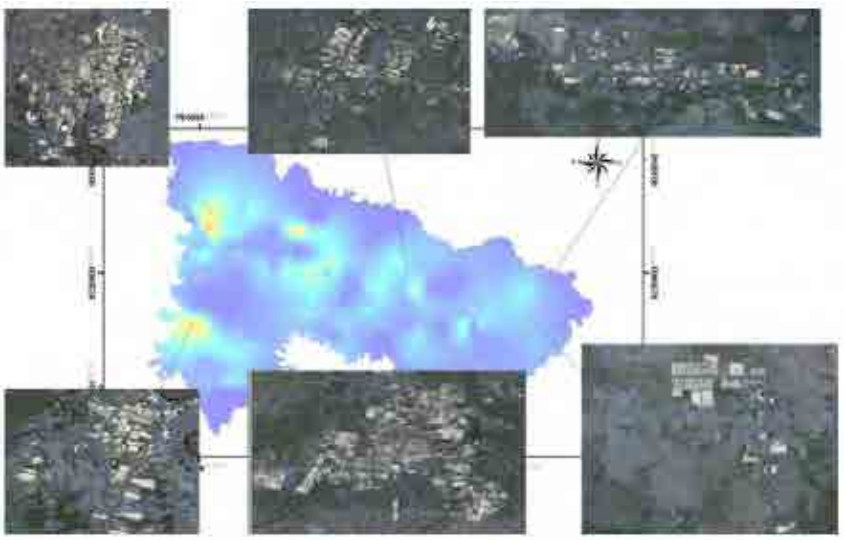


Gumilar *et al*., (2015)

D

- Figure C showed an integrated map of Bandung basin land subsidence map (A) and aquifer damage map (B)
- Figure D showed correlationship between land subsidence (red) and decrease of groundwater table (blue) in several areas of Bandung basin

Building Load and Land Subsidence in Bandung Basin

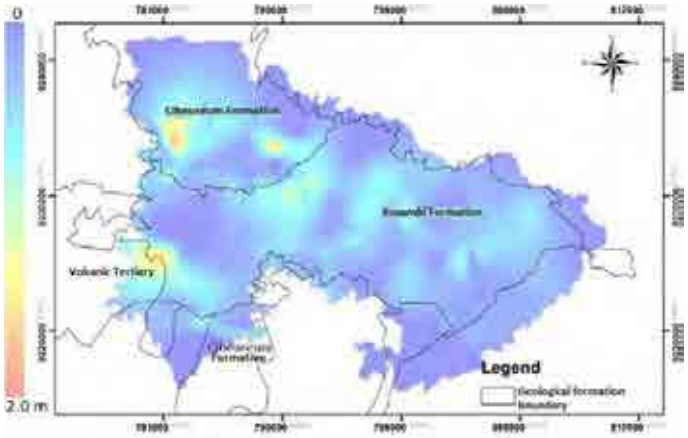


Industrial Activity in Several Areas of Bandung Basin

Most of land subsidence areas in Bandung basin are also industrial areas with relatively high rate of building construction

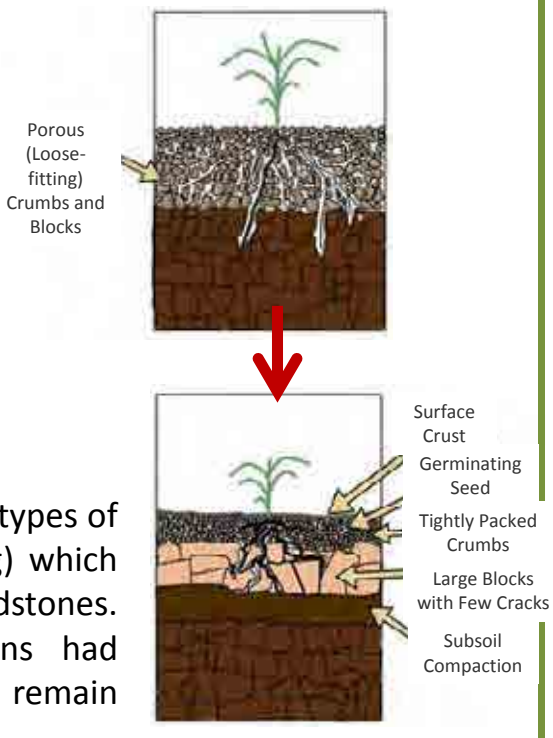
Gumilar *et al*., (2015)

Soil Compaction and Land Subsidence in Bandung Basin



Several Formations in Bandung Basin

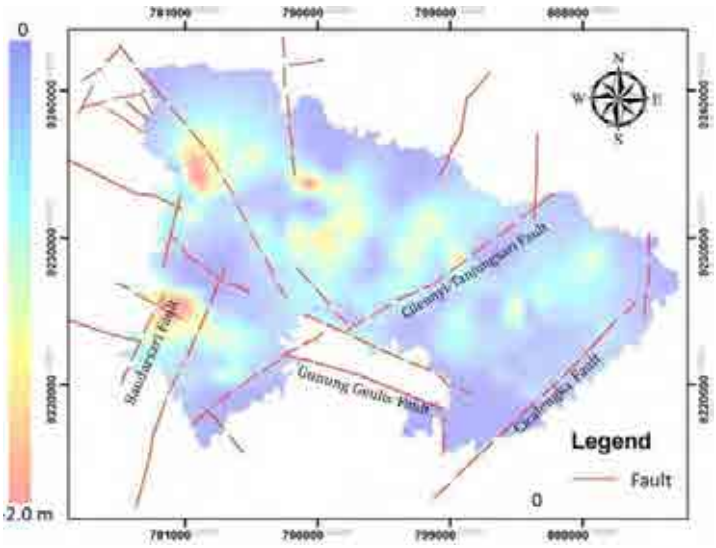
Geologically, Bandung basin is based on several types of formations (Kosambi, Cibeureum, Cikapundung) which mainly consist of clay, siltstone, and sandstones. Geological data showed that the formations had undergone compaction from Holocene age and remain active until nowadays



Depiction of Soil Compaction

Gumilar *et al*., (2015)
https://www.sare.org/Learning-Center/Books/Building-Soils-for-Better-Crops-3rd-Edition/Text-Version/Soil-Degradation-Erosion-Compaction-and-Contamination/Soil-Tilth-and-Compaction

Tectonic Activity and Bandung Basin Land Subsidence



Fault Activity in Several Areas of Bandung Basin

The geological structure in the Bandung basin area and its surroundings is fault structure found in the form of fault straightness, fault shift (relative motion). There are fault ruptures along the direction of West-East, Southwest-Northeast, and North-South

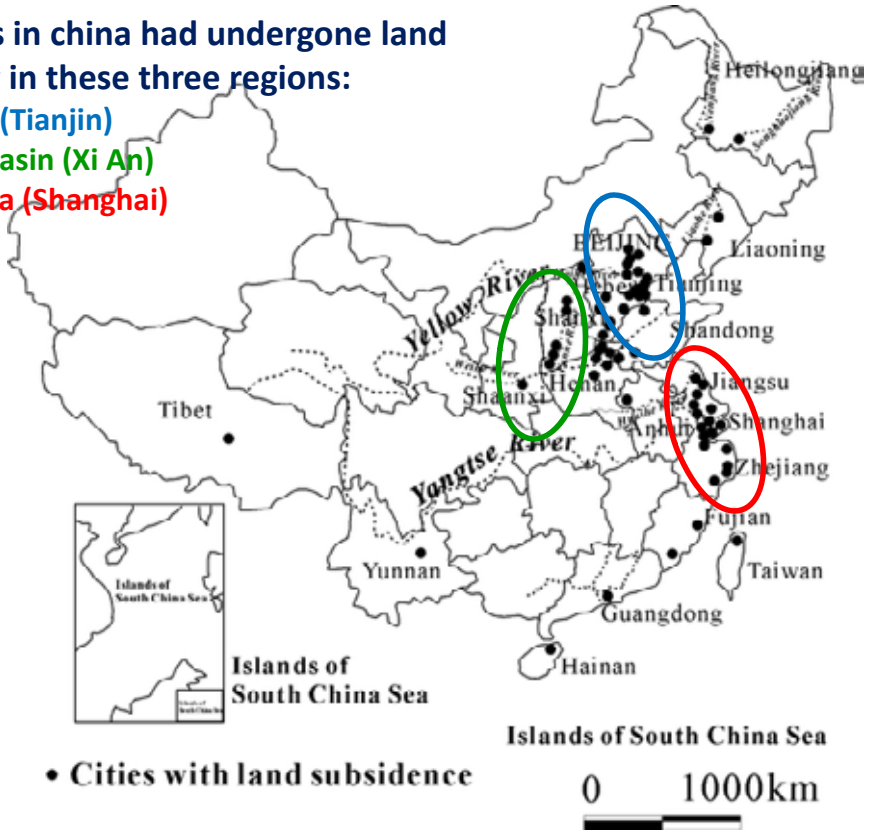
Gumilar *et al*., (2015)

LAND SUBSIDENCE IN CHINA

Land Subsidence in China

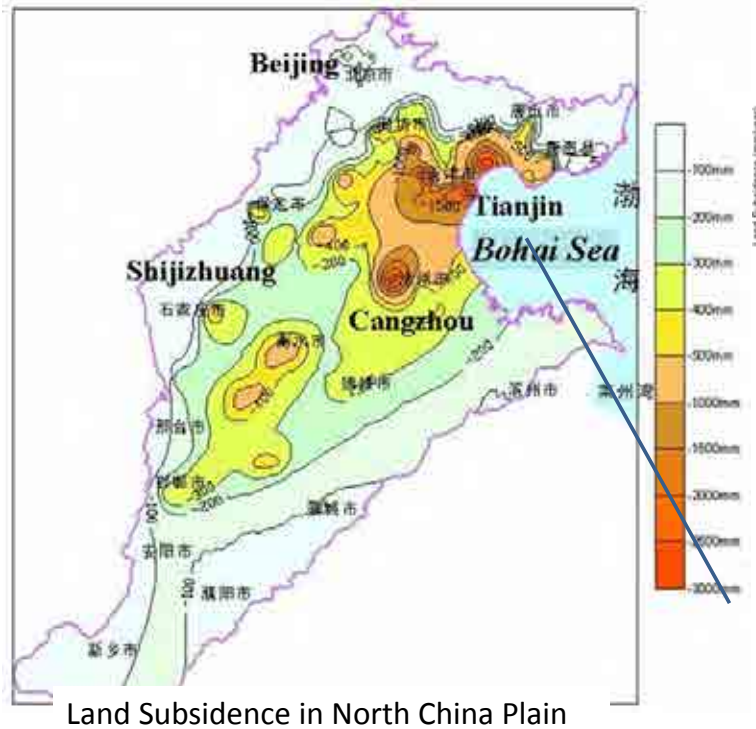
More than 50 cities in china had undergone land subsidence, mainly in these three regions:

- **North China Plain (Tianjin)**
- **Fen-Wei Faulted Basin (Xi An)**
- **Yangtze River Delta (Shanghai)**



https://www.iges.or.jp/en/natural-resource/groundwater/PDF/5_LandSubsidenceChina-CCOP.pdf

Land Subsidence in North China Plain



Land Subsidence in North China Plain

Land Subsidence in Tianjin City 1959-1995 (mm/year)

Tianjin City

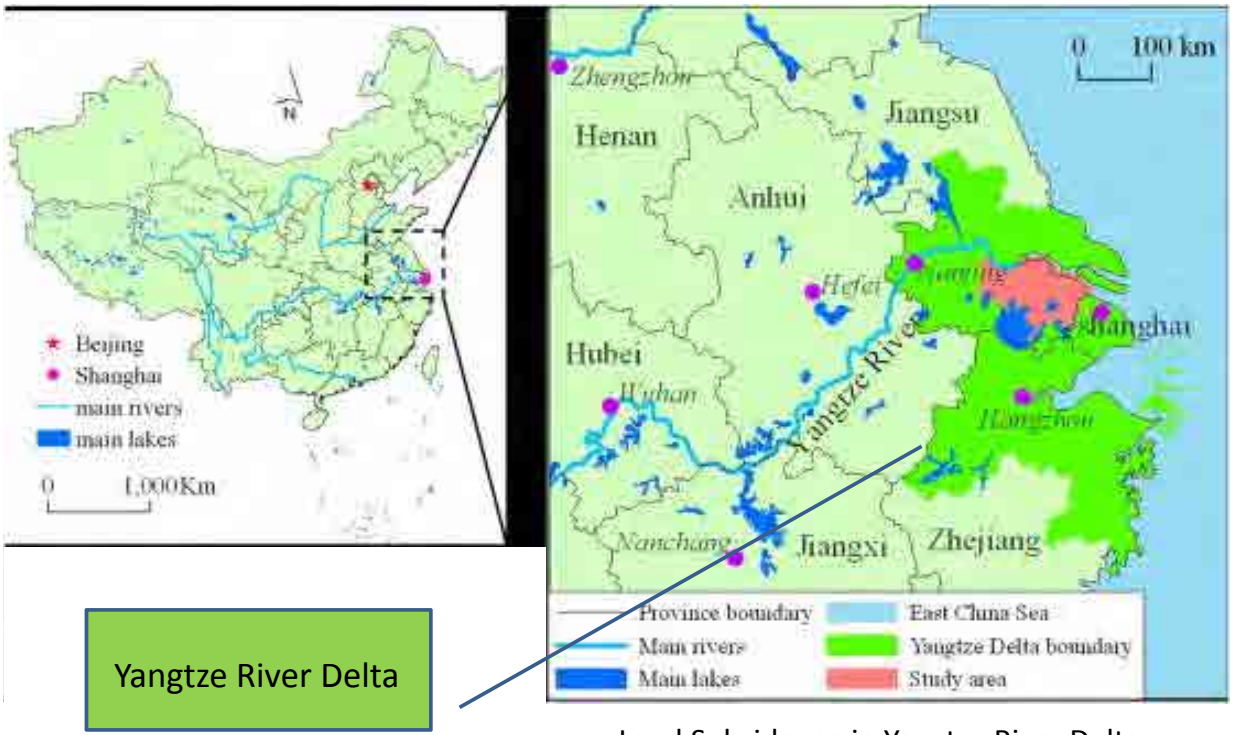
https://www.sciencedirect.com/science/article/pii/S0197397511000166

Land Subsidence in Fen-Wei Faulted Basin

Land Subsidence in Fen-Wei Faulted Basin

https://www.iges.or.jp/en/natural-resource/groundwater/PDF/5_LandSubsidenceChina-CCOP.pdf

Land Subsidence in Yangtze River Delta



Yangtze River Delta

Land Subsidence in Yangtze River Delta

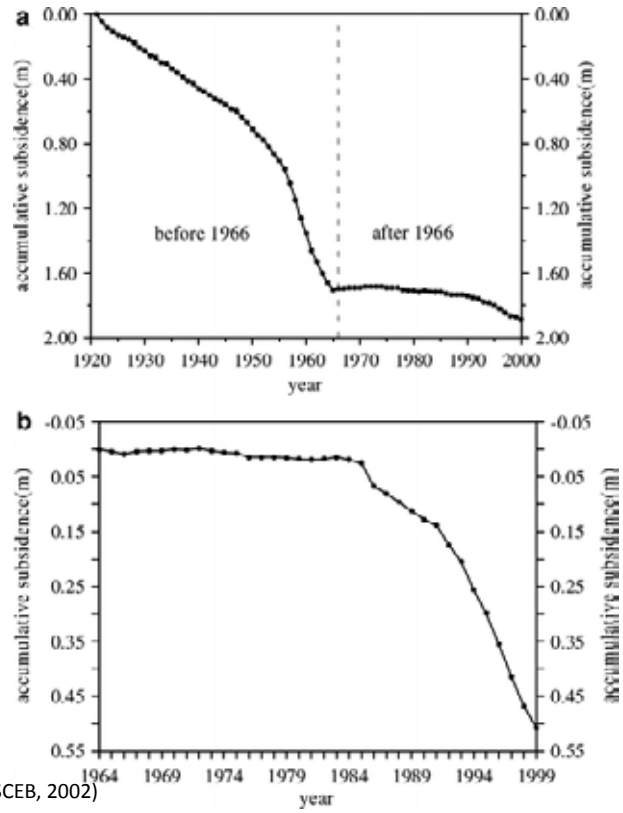
https://www.sciencedirect.com/science/article/pii/S0197397511000166

Land Subsidence in Yangtze River Delta

- About 10000 Km^2 of land has dropped more than 200 mm.
- The accumulative subsidence in Shanghai and Wuxi are 2980mm and 2800mm, respectively.

Accumulative subsidence countour in the Yangtze Delta (until 2010)

Land Subsidence in Yangtze River Delta—Shanghai City



(GSCEB, 2002)

- Figure a

Average accumulative subsidence of Shanghai City

- Figure b

Accumulative subsidence of Labor Park in Shanghai City

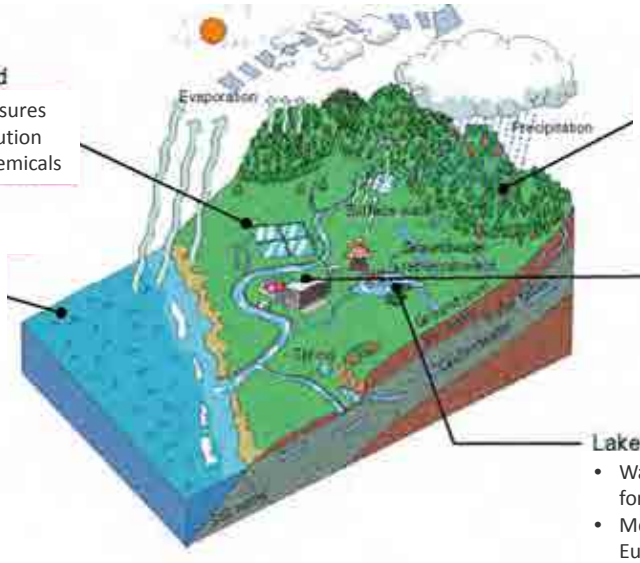
Main Causes of Land Subsidence in Yangtze River Delta

- Geological conditions:
  thick soft sediments with high compressibility
- Human activities:
  1. Groundwater extraction
  2. Building load

Rapid expansion and development of industrialization and urbanization are also most important factors for accelerating land subsidence.

COUNTERMEASURES

Restoration of Healthy Hydrological Cycle



Farmland
- Soil Pollution Measures
- Prevention of Pollution by Agricultural Chemicals

Sea areas
- Measures to Prevent Eutrophication
- Conservation and Restoration of Seaweed Beds and Tidelands

Measures for Drinking Water Resources

Urban areas
- Effluent Control
- Measures for Domestic Wastewater
- Groundwater Pollution Measures
- Soil Pollution Measures
- Ground Subsidence Measures

Lakes and reservoirs
- Water Quality Conservation Plan for Lakes and Reservoirs
- Measures to Prevent Eutrophication

Restoration of Healthy Hydrological Cycle

Example: Groundwater Management in Tokyo
- Pumping regulations
- Groundwater recharge
- Water quality management

http://www.env.go.jp/en/aboutus/pamph/html/00pan100.html

CONCLUSIONS

Conclusions

- Land subsidence can bring serious consequences if it is not well handled
- Land subsidence is caused by human activities or natural disaster such as groundwater extraction, oil/natural gas extraction, earthquake, and building load
- Several countermeasures can be done to slow down the rate of land subsidence

DISCUSSION

Discussion Topics

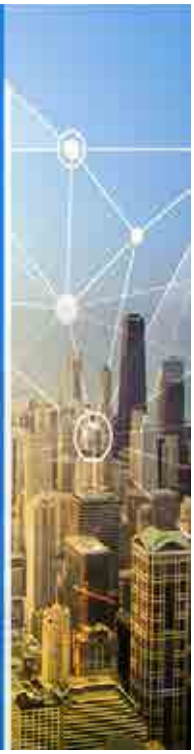
- Why should we need to care about land subsidence?
- Are there any other countermasures against land subsidence? What are they?

Countermeasure

- Restoration of healthy hydrological cycle
- Expand the recharge (permeable) area
- Prevent groundwater flow obstruction
- Prevent unconfined ground water leakage into the lower confined aquifer
- Optimization of local allocations or distribution in groundwater pumping volume
- Optimization of pumping wells in depth and location
- Optimal operation of pumping wells in avoiding a rapid groundwater drop

Contents

- What is ICT ?
- ICT × environmental issues
- ICT and environmental issues in Japan and Indonesia
- Conclusion
- Discussion topics



What is ICT?

☞ The combination of a computer network technology with telecommunication is called *Information and Communication Technology (ICT)*.

☞ICT is a general term for industries and services that use communications technologies like the Internet.

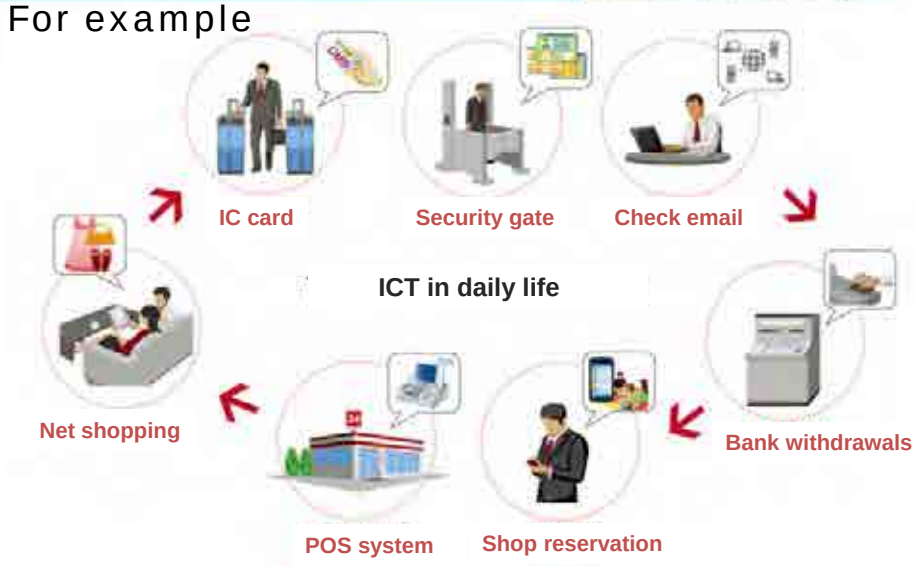
https://hnavi.co.jp/knowledge/blog/ict/

☞ICT can be defined as the set of technological tools and resources used to communicate and create, disseminate, store and manage information.

☞These technologies include computers, internet, broadcasting technologies and telephony.

What is ICT?

For example



https://mypage.plus.i-web.jpn.com/fjm/ict/index.html

Advantages of ICT

http://gcti.com/how-cloud-phone-systems-provide-time-saving-solutions-for-it-managers/

- ☞Time saving.
- ☞Receive information faster and timely.
- ☞Enables and facilitates communication.
- ☞Reduce the cost of communication such as e-mail and telephone.(LINE , Skype, Facebook etc…)
- ☞Safer and easier money transfer.
- ☞Creating new jobs.
- ☞It has various possibilities.

Disadvantages of ICT

- ☞There is a security problem. (Hackers , Viruses)
- ☞Diseases
  (Visual Display Terminal syndrome , Internet addiction disorder)
- ☞e-waste
- ☞Internet and child safety issues.
- ☞It takes time to recover when the system goes down.
  and Not everyone can cure the system.
- ☞Job losses.
- ☞Slander on the net.

https://www.irasutoya.com/

What is environmental issues?

Etc…

× ICT

(Collaboration)

ICT ×Environmental issues Advantages

For example, measures against global warming by ICT

☞Using ICT tools and systems can cause CO2 emissions.

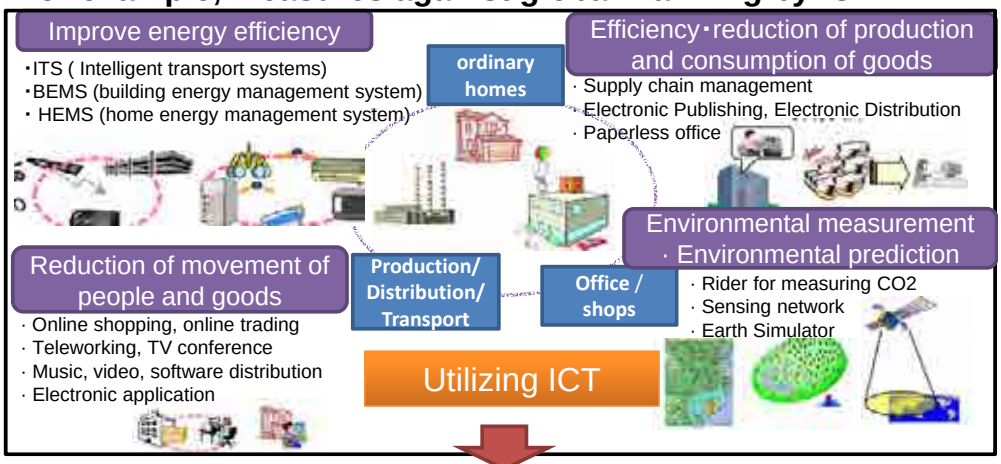
☞But, it is possible to improve “efficiency of energy use", "reduction of movement of people and goods” , “efficiency improvement and reduction of production and consumption of goods” by utilizing ICT. In the end it is possible to contribute to reduction of CO2 emissions in various fields by utilizing ICT.

☞Moreover , ”Environment measurement” and “Environmental prediction” is also possible by using ICT.

https://hnavi.co.jp/knowledge/blog/ict/

ICT ×Environmental issues Advantages

For example, measures against global warming by ICT



Contributing to the mitigation of global warming by promoting the spread of ICT utilization

http://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h22/pdf/n2010000.pdf

ICT ×Environmental issues Disadvantages

E-waste problem

- ☞ICT needs electronic equipment.
- ☞E-waste is a term used to cover all items of electrical and electronic equipment and its parts have been discarded by its owners as waste.
- ☞E-waste includes a wide range of used e-products, almost any household or business item with circuitry or electrical components with power or battery supply.

http://www.palmeira.pr.gov.br/?attachment_id=4708

ICT ×Environmental issues Disadvantages

☞In the future E-waste will continue to increase at 4 - 5% per year, and it was estimated that it'll reach 49.8 million tons in 2018.

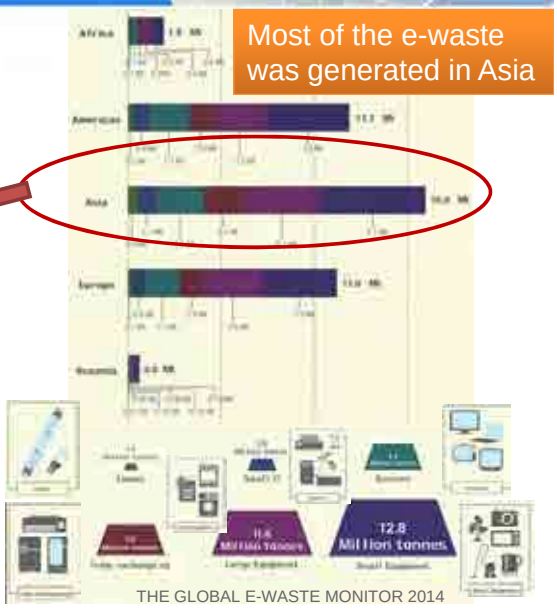
THE GLOBAL E-WASTE MONITOR 2014

ICT ×Environmental issues Disadvantages

E-waste problem

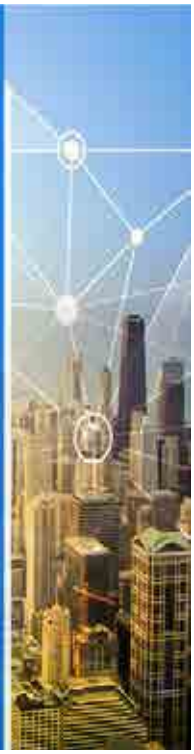
United Nations University :
Regional E-waste Monitor: East and Southeast Asia

Most of the e-waste was generated in Asia



THE GLOBAL E-WASTE MONITOR 2014

ICT and environmental issues In Japan



Visualize power consumption

Power plugs that can visualize power consumption

Visualization

↓

Recognize useless power consumption

↓

Conscious behavior

↓

Reduction of unnecessary power consumption

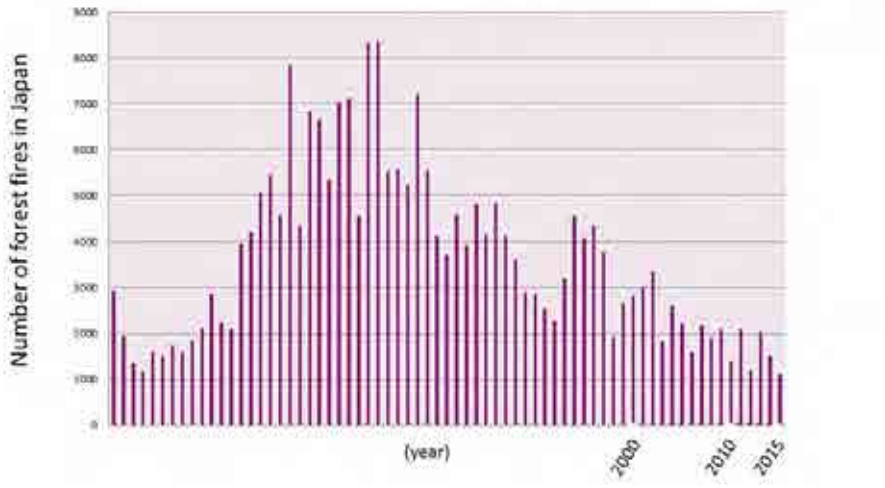
☞A joint experiment by FUJITSU with Yokohama City was conducted and it was reported that Visualize power consumption could suppress about 20% of power consumption for desktop PCs and about 5% for laptop computers. Photo https://journal.jp.fujitsu.com/2014/08/01/01/

Monitor the forest in case forest fires

☞These years, in Japan, as agricultural community aged, abandoned areas of cultivation are increasing.
If the abandoned areas of cultivation increase, forest fires are expected to increase.

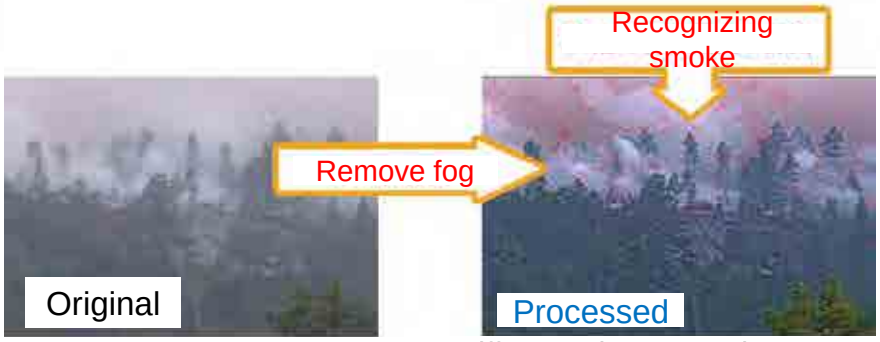
☞The cause of forest fires in Japan is mostly artificial factors such as tobacco and bonfire.

Monitor the forest in case forest fires



From Ministry of Agriculture, Forestry and Fisheries HP

Monitor the forest in case forest fires



Mist and smoke can not be distinguished from each other

Difference becomes clearer and smoke can be easily recognized

☞Monitor the forest with a surveillance camera, detect smoke when a fire occurs, and report it.

☞The verification test for monitoring the forest in China has been finished.

Utilization of ICT In case of disaster

☞In Japan, we can't avoid from natural disasters.

☞In this year, disasters were brought about by earthquakes, heavy rains, typhoons, etc.

Photo Kobe City HP

Photo https://www.nikkei.com/article/DGXMZO34943790U8A900C1000000/

Utilization of ICT
In case of disaster

☞In recent years, many torrential rains have occurred in Japan. Under such circumstances, a system that can grasp the flow rate of the river nearby by the GPS function of the smartphone was developed and it is applied in Kanto prefecture.

☞Due to recent climate change, Japan is suffering from sudden natural disasters. ICT is greatly expected to deal with the sudden natural disasters.

ICT and environmental issues In Indonesia

ICT and environmental issues In Indonesia

http://spbn.pusfatja.lapan.go.id/

☞**SIMBA** is information System for dissaster mitigation based on remote sensing provided by LAPAN (National Institute of Aeronautics and Space)

☞**DAILY INFORMATION:**

- Cloud Coverage (Satellite: TRMM, Qmorph)
- Fire (Fire Hotspot and Fire Danger Rating System)
- Flood Prediction
- Oceanic parameter (Lower Survival Temperature and Chlorophyll)

ICT and environmental issues In Indonesia

https://itunes.apple.com/us/app/info-bmkg/id1114372539?mt=8

☞BMKG mobile is IOS and Android application for weather, air quality and earthquake information, making it easier and quicker for the public to access the information.

ICT and environmental issues In Indonesia

☞SIGN-SMART is a platform for greenhouse gas inventory in Indonesia to meet the principles of TACCC (Transparency, Accuracy, Completeness, Comparability and Consistency)

http://signsmart.menlhk.go.id/signsmart_new/web/home/

☞SIGN-SMART has been developed since the beginning of 2015.
☞This SIGN-SMART is a simplification of the IPCC method that is widely accessible both nationally and internationally.

ICT and environmental issues In Indonesia

http://ditjenppi.menlhk.go.id/srn/index.php#stat

ICT and environmental issues In Indonesia

https://www.inovasee.com/bahaya-sampah-elektronik-35710/

☞Indonesia had not a special regulation for e-waste.
☞Referring to Law No. 18 of 2008 on Waste Management, e-waste is categorized as specific waste that means a waste needs a specific management because of its nature, concentrate and/or volume.

ICT and environmental issues In Indonesia

E-Waste Management in Indonesia

http://mediaindonesia.com/read/detail/125265-limbah-elektronik-akan-dikelola

https://pbde.bppi.kemenperin.go.id/files/materi/1.4_ED-Perindust-EEE-PDBE-08012018.pdf

ICT and environmental issues In Indonesia

E-Waste Management in Indonesia

https://pbde.bppi.kemenperin.go.id/files/materi/1.4_ED-Perindust-EEE-PDBE-08012018.pdf

Conclusions

- ☞ ICT and their applications can have both positive and negative impacts on the environment.
- ☞ In Japan ICT application such as visualizing power consumption used for reduction of unnecessary power consumption contributes to environmental preservation.
- ☞ Due to natural conditions and location, Japan is a country that is prone to various natural disasters and ICT already applied to mitigate the disasters.
- ☞ In Indonesia ICT application on mitigation and environmental preservation still under development.
- ☞ E-waste management in Indonesia still become a big issue that should be resolved.

Discussion topics

1. Do you think ICT is good for the environment from the long term point of view?

2. What can we do with ICT against environmental issues?

Is Bali Island a true paradise?

Hiroki Maruyama (M1)
Jiang Shuqin (M2)
Poltak Sandro Rumahorbo (M2)

What is paradise?

The word "paradise" entered English from the French paradis, inherited from the Latin paradisus, from Greek parádeisos (παράδεισος), from an Old Iranian *paridayda- "walled enclosure".

Religion	Meaning
Christianity	The earthly "school" for soul of the righteous dead.
Mormonism	The state of the righteous after death.
Greek Mythology	The place where the soul of the hero lives and is loved by God.
Buddhism	Place where there is happiness
Islam	The ultimate pleasurable place after death for those who believe in God.

Paradise is a place of exceptional happiness and delight

https://ja.wikipedia.org/wiki/%E6%A5%BD%E5%9C%92_(%E5%AE%97%E6%95%99)

Why Bali Island is called paradise?

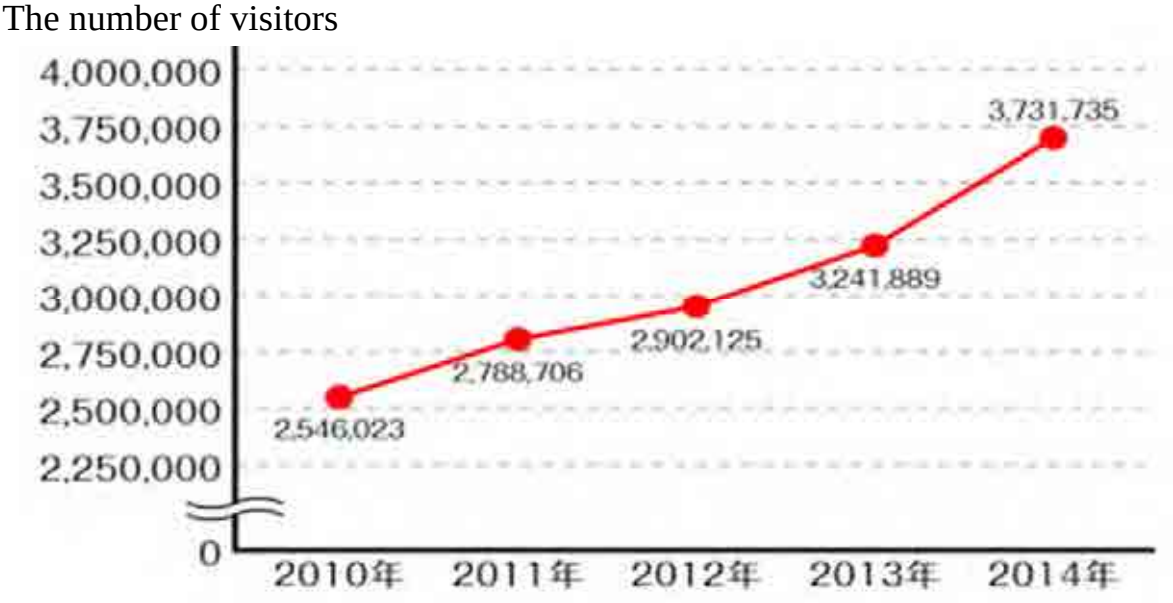
IMAGES OF BALI ISLAND

- Varied landscapes of hills and mountains
- Rugged coastlines and sandy beaches
- Lush rice terraces
- Deeply spiritual and unique culture

.....

How many people visit Bali Island?

The number of visitors



Visitor numbers to Bali Island is steadily increasing

https://search.yahoo.co.jp/image/search?p=%E3%83%90%E3%83%AA%E5%B3%B6+%E8%A6%B3%E5%85%89%E5%AE%A2%E6%8E%A8%E7%A7%BB&search.x=1&tid=top_ga1_sa&ei=UTF-8&aq=-1&oq=%E3%83%90%E3%83%AA%E5%B3%B6+%E8%A6%B3%E5%85%89%E5%AE%A2%E6%8E%A8%E7%A7%BB&ai=136l6Xr2TP.M7GArN27FPA&ts=10310&fr=top_ga1_sa#mode%3Ddetail%26index%3D11%26st%3D549

SEVERAL ASPECTS

1. Geography
2. Culture
3. Tourisms
4. Environmental Issues

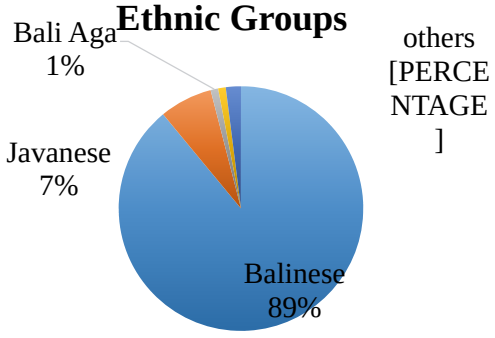
1. Geography

Where is Bali Island?

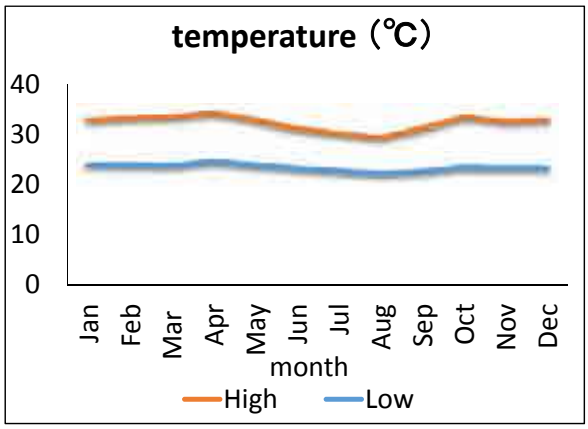
Indonesia

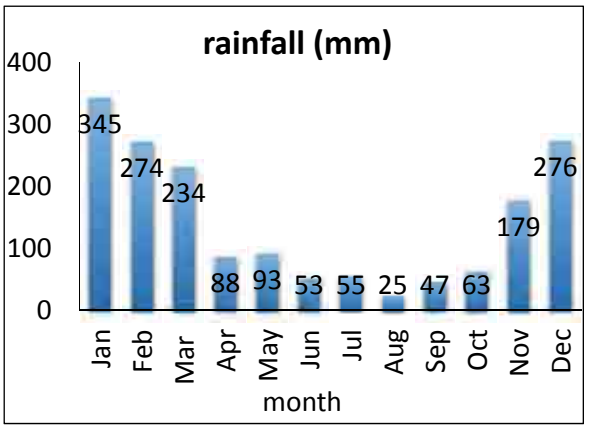
Bali Island

	Bali Island	Indonesia
Area	5500 km^2	1.89 million km^2
Population	4 million people	240 million people



Climate



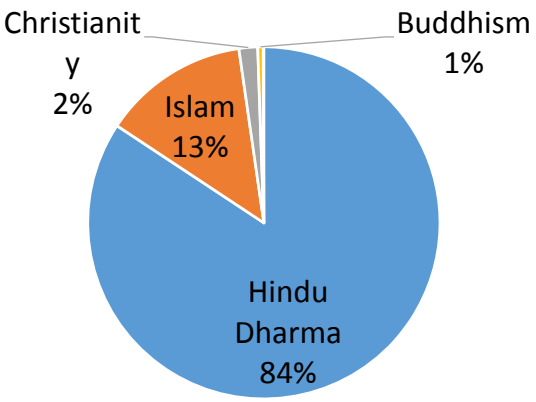


https://www.compathy.net/magazine/2015/12/22/weather-forecast-bali-best-season/

- The annual temperature fluctuation is small throughout the year.
- The climate is divided into the rainy season from November to March and the dry season from April to October. However, its boundary is gentle. Rain has many tropical peculiar squalls, but sometimes it lasts all day.

2. Culture

Religions



Indonesia …… Islam (90%)
Bali …… Hindu (84%)

God of New Beginnings, Success and Wisdom

https://en.wikipedia.org/wiki/Ganesha#/media/File:Ganesha_Basohli_miniature_circa_1730_Dubost_p73.jpg

Festivals

Bali Event Calendars

Bali Arts Festival

Bali Kites Festival

Chinese New Year

Saraswati

Nyepi

Galungan and Kuningan

http://www.bali-indonesia.com/culture/festival.htm

Bali's most important festival. It is a feast and festival which is held throughout the whole island and an annual event coinciding with the wuku year.

It is believed that during the ten-day period, all Balinese gods will descend to earth for the festivities. Barongs prance from temple to temple and village to village in celebration of Galungan with the gods. In last day (Kuningan festival) gods will ascend from the earth and return to heaven, then the festival finishes.

Makepung Buffalo Races

http://www.bali-indonesia.com/culture/festival.htm

Makepung is Bali's famous bull race, which takes place around harvested paddy fields around the town of Jembrana in the regency of Negara in West Bali.

The official grand prix of buffaloes is designated as the Governor's Cup or 'Piala Bupati', which is scheduled every year around the month of July, and leads up to the finals and main celebrations around the month of November.

Traditional Dancing

Kecak Dance

- Dance based on "Sanghyang Dance" of the ceremonial dance which is transmitted from long ago.
- The story depicts the battle between Prince Lama of Ayodyia (the symbol of goodness) and King Lafwana (evil symbol) of the evil Kingdom of Aleenka.

Legong Dance

- Dance with splendid costumes and delicate movements.
- It has been developed as a court dance, glittering female dancers dance brilliantly and is known as the most beautiful dance in Bali.

https://www.hirochan-group.com/regular/bali-information-culture.html

Foods

Lawar

Nasi Ayam and Nasi Campur

Bebek and Ayam Betutu

Babi Guling

Traditional Cakes and Desserts

Jimbaran Seafood

http://www.bali-indonesia.com/dining/best-food.htm

3. Tourisms

Temples

Besakih Temple

Goa Gajah

Ulun Danu Beratan Temple

http://www.bali-indonesia.com/magazine/bali-must-see-temples.htm

Tirta Empul Temple

Gunung Kawi Temple

It is one of Bali's most unique archaeological sites. The temple comprises a collection of ancient shrine reliefs carved into the face of a rock cliff.

http://www.bali-indonesia.com/magazine/bali-must-see-temples.htm

Beaches

Seminyak Beach – best for the hedonists

Nusa Dua Beach – best for a family day out

Jimbaran Bay – best for seafood sunsets

Balangan Beach – best for surf & sunbathing

https://thehoneycombers.com/bali/best-beach-bali-swim-surf-sand/

Other attractive places

Ubud Art Market

The Sidemen Valley

Mount Batur

Bali Safari and Marine Park

Sekumpul Waterfall

Ubud Monkey Forest

http://www.bali-indonesia.com/attractions/top-ten.htm
https://www.planetware.com/tourist-attractions-/bali-ina-b-b.htm

4. Environmental issues

Garbage

- Average volume of waste generation in Bali is 10,849.10 m^3 per day.

.

- The local government deploys 35 trucks to dispose 100 tons of garbage every day

Garbage in the sea

https://www.google.co.jp/search?q=garbage+in+bali+sea&rlz=1C1KUBR_enJP807JP807&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiW95HInuzdAhWKiLwKHU0BD4YQ_AUIDigB&biw=1600&bih=740#imgrc=biqk-2RrdsPZeM:

Garbage at beach

Bali Island has declared a "garbage emergency" after the country's most popular tourist beaches were inundated with a rising tide of plastic waste.

https://www.straitstimes.com/sites/default/files/styles/article_pictrure_780x520_/public/articles/2017/12/28/indonesia-rubbish-bali-environment-012440.jpg?itok=jPaOGIzr&timestamp=1514439020

Traffic Jam

https://www.google.co.jp/search?q=traffic+jam+in+bali&rlz=1C1KUBR_enJP807JP807&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjzzZGg-uvdAhXJ0J8KHQMpDnQQ_AUIDigB&biw=1600&bih=740#imgrc=yA1vCfsZsqHvvM:

- Population boom in Bali Island is relatively high with 673 people/km^2 compared to national average which is 124 people/km^2.
- Several main roads are over-crowded with numbers of cars and motor cycles. 71.81% of vehicles are motorcycles while 19 % are cars.
- Traffic jams in Bali Island also produce more air and noise pollution.

Conclusion

1. Bali Island is a beautiful island with wonderful places.
2. Bali Island has unique culture such as festivals, traditional dancing, foods …..
3. Bali Island attracts many tourists from all over the world every year.
4. Bali Island has environmental problems, especially related to garbage problem.

Discussion Topics

1. What is “true paradise” for you?
2. Is Bali Island a “true paradise”?

e-Books are more eco-friendly than Paper Books?

Raj Kishan Agrahari (D1)
Li Shuailei (M2)
Misato Hayashi (M1)

https://theecoguide.org/books-vs-ebooks

Contents

- Introduction
- Paper Books Vs e-books
- e-book users in Japan, India & China
- Future prospects of Paper Books & e-books
- Impacts of Paper Books & e-books on Environment
- Conclusion
- Discussion topics

https://nghscrimsontimes.com/2901/student-life/ebooks-vs-print-books/

Introduction

What is a Paper book?

A book is a physical book that has the text, images, etc., printed on paper. The pages are bound together, and the book has either a hardcover, or soft cover (paperback).

What's an e-Book?

An electronic version of a printed book with more multimedia attached.

History

- Although there is no exact date known, between 618 and 907 AD–The period of the Tang Dynasty (China) –the first printing of books started.
- The first e-book:- The Index Thomisticus- 1946, by Roberto Busa.
- Andries van Dam from Brown University. coined the term "electronic book", in 1965.
- Project Gutenberg- first digital library 1970.

https://www.tablethelpline.com/what-is-the-process-of-transfer-pdf-files-to-kindle-e-reader

Introduction

e-Readers?

An e-reader, also called an e-book reader or e-book device, is a mobile electronic device that is designed primarily for the purpose of reading digital e-books and periodicals.

Early e-Readers:

1. Rocket eBook -NuvoMedia [1998](can store up to ten e-books).
2. Gemstar International and Softbook Press Inc- reintroduced it as RCA eBook Reader [2000].

The Young e-Reader

The Tech lab's Vinci Tablet for children from 0-5 years, by Dr. Dan Yang.

http://www.youtube.com/watch?v=SwuDacUN9NI

For Kinder garden kids:

http://www.raz-kids.com/main/ViewPage/name/sample

For School children:

http://catalog.flatworldknowledge.com/bookhub/reader/128?cid=&e=redden-chab

http://catalog.flatworldknowledge.com/catalog/editions/68

https://www.tablethelpline.com/what-is-the-process-of-transfer-pdf-files-to-kindle-e-reader

Paper books Vs e-books

e-books

Advantages

1. Easy to carry
2. A little cheaper
3. No deterioration
4. Zero consumption paper
5. Access from anywhere

Disadvantages

1. A possibility of terminal equipment can be broken
2. A possibility of illegal copying will rampant
3. Difficult to read it with different standards
4. Difficult to lend and borrow

paper books

Advantages

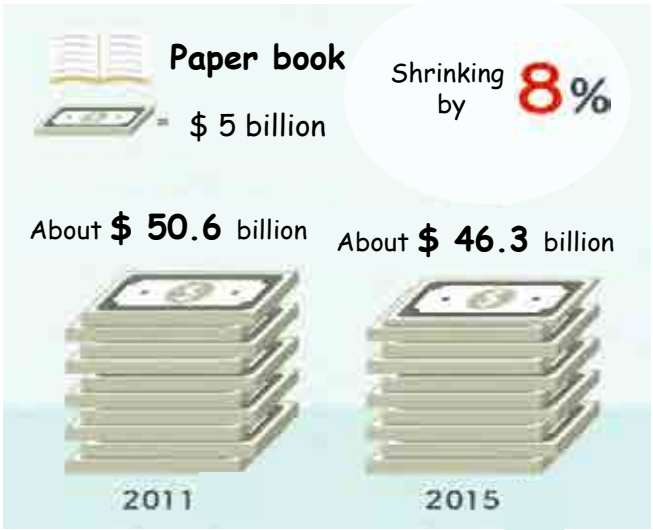
1. Easy to read
2. Less tiring than e-book
3. Have a paper feeling
4. More fruitful for reading
5. Bookmark is easy

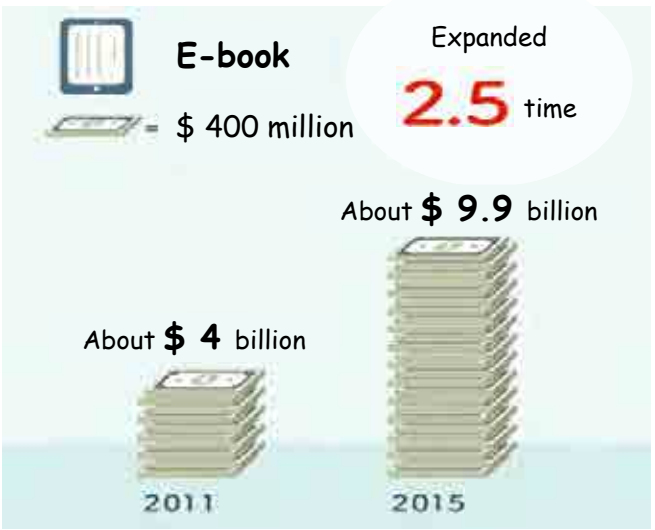
Disadvantages

1. Can not get it right away
2. Will take up space
3. Can be degraded
4. Can not make it without cutting wood
5. There is a possibility of going out-of-print

Paper books Vs e-books

Sales growth of paper books and e-books (world)



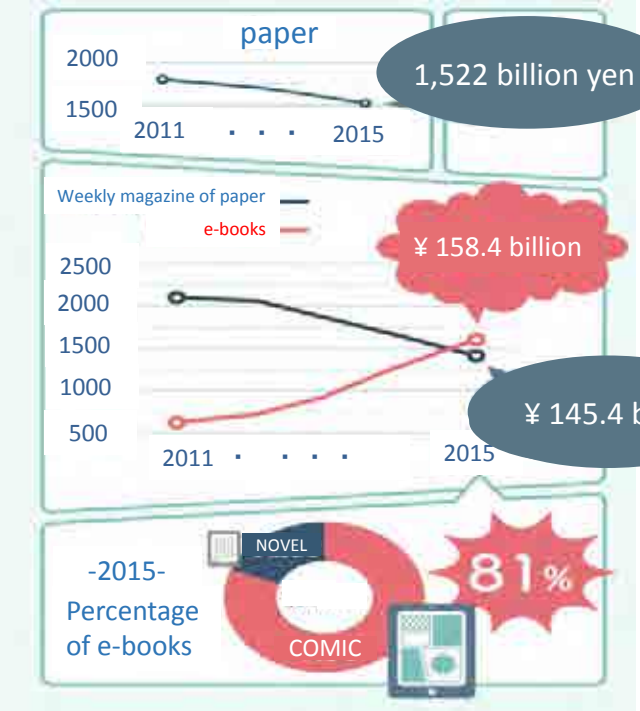


According to the paper "Global Entertainment and Media Outlook ", contents competing with the spread of the Internet and the development of mobile terminals are increasing, and sales of paper books continue to decrease worldwide. Paper book market shrank by 8% from 2011 to 2015. On the other hand, sales of e-books expanded 2.5 times during the same period.

https://vdata.nikkei.com/datadiscovery/21book/

e-book users in Japan

e-books and paper books market in Japan



- Japanese e-book market increased 2.5 times from 2011 to 2015.
- Sales of paper publications have declined for 11 consecutive years.
- In Japan, there is a feature not found in other countries where comics account for 80% of e-books.

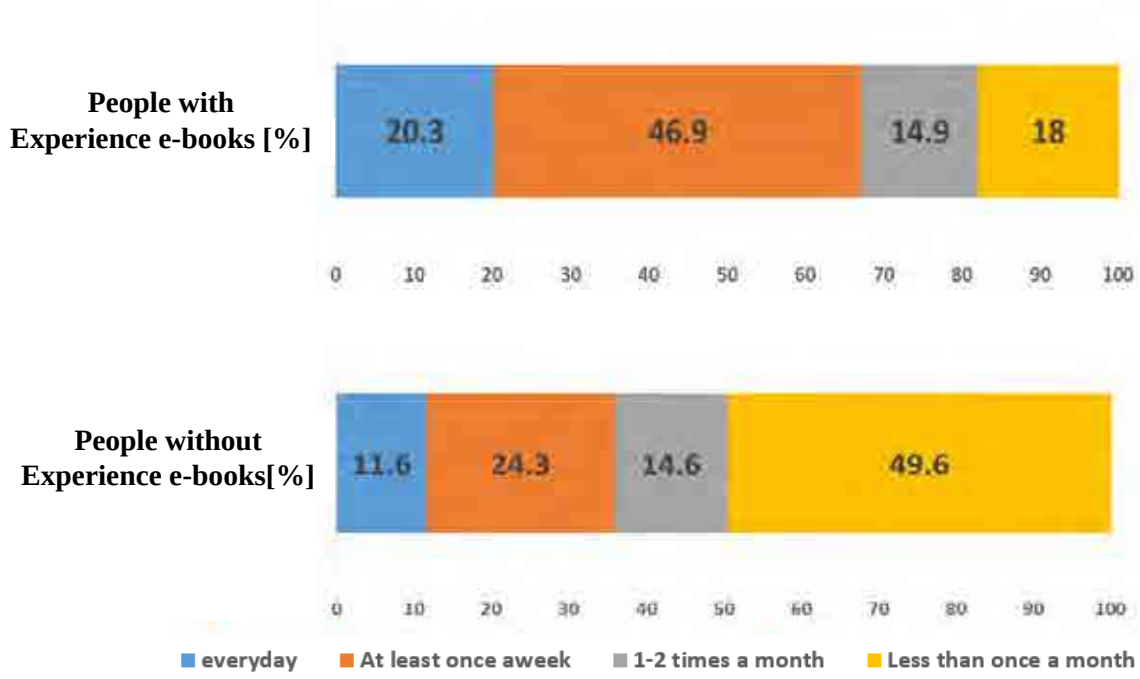
https://vdata.nikkei.com/datadiscovery/21book/

e-book users in Japan

Reading frequency of paper books

1. Frequency to read paper books

(People with Experience e-books N=557/ People without Experience e-books N=1,235)

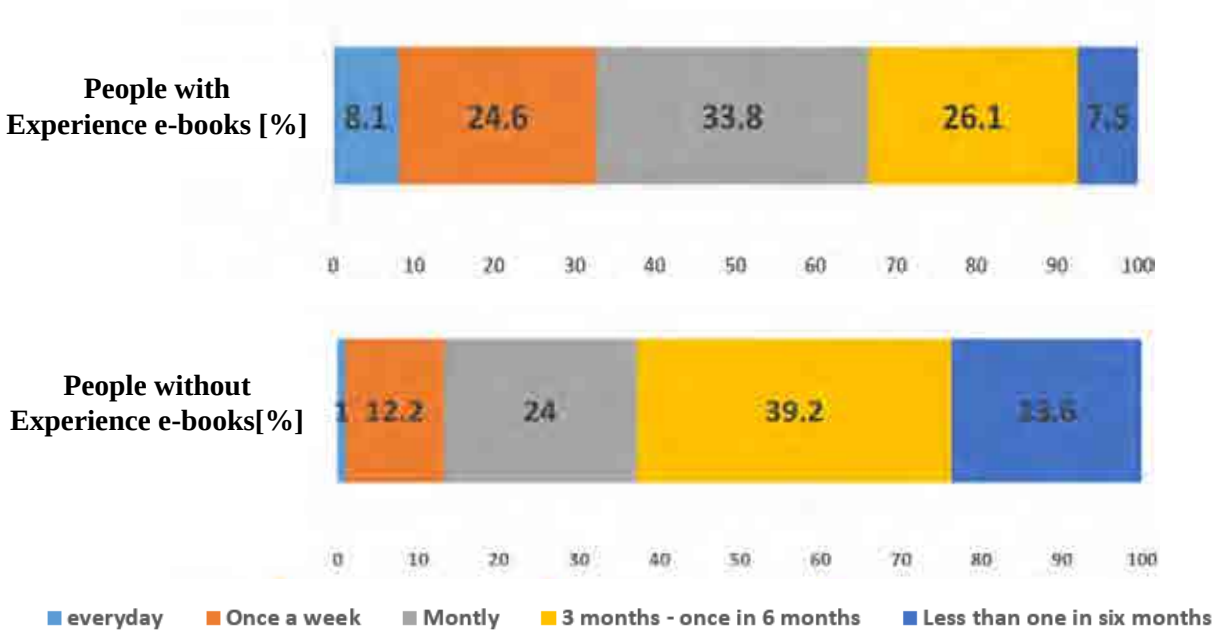


https://mmdlabo.jp/investigation/detail_1422.html

e-book users in Japan

Reading frequency of paper books

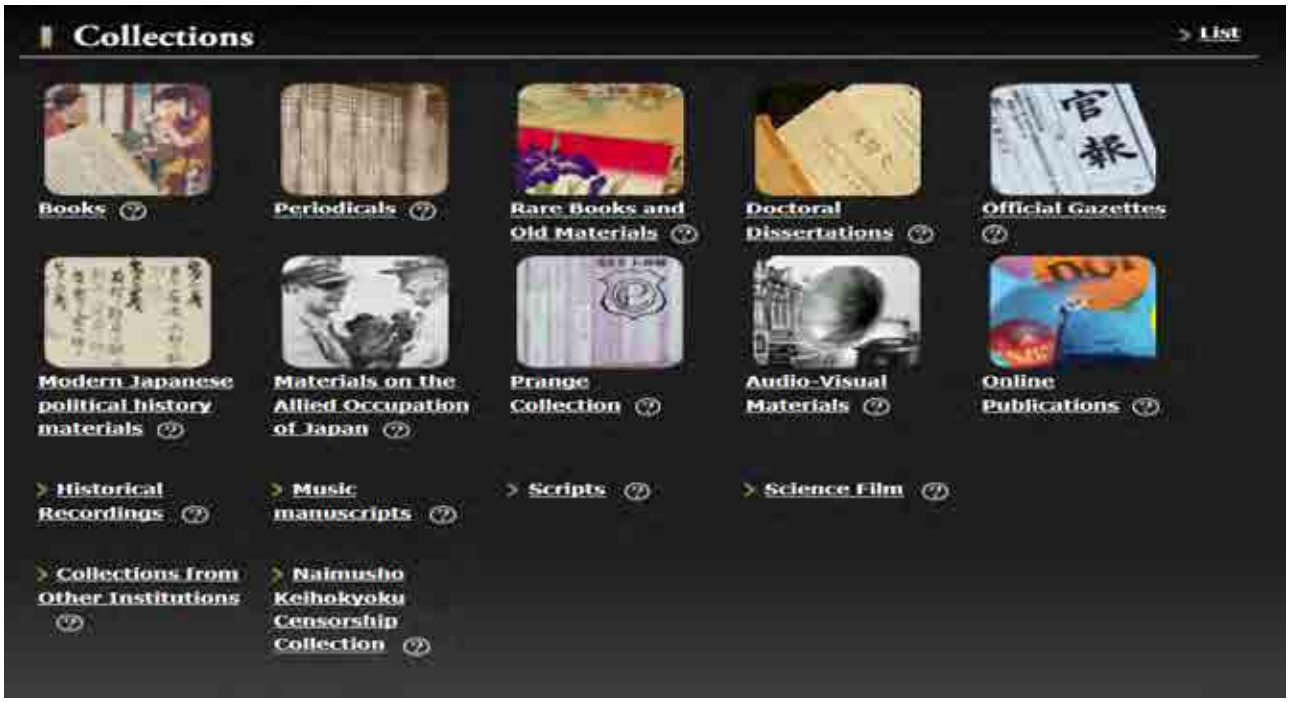
2. Purchase frequency of paper books
(People with Experience e-books N=545/ People without Experience e-books N=901)



https://mmdlabo.jp/investigation/detail_1422.html

e-book library of Japan

As a method of browsing e-books, there is "National Diet Digital Collection" in Japan. Here, you can search and browse the digital materials collected and stored by the National Diet Library.

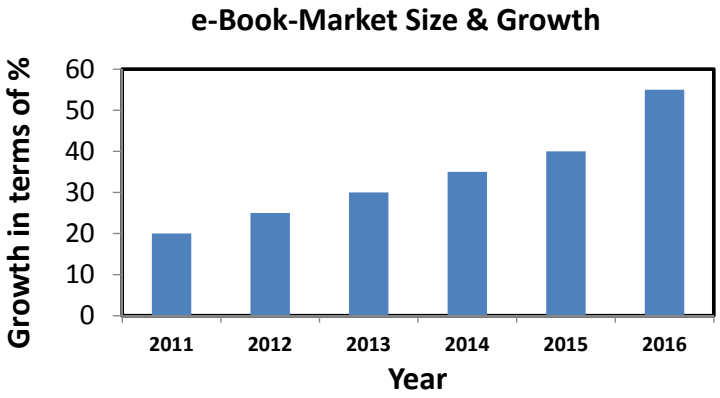


http://dl.ndl.go.jp/

India

e-book users in India

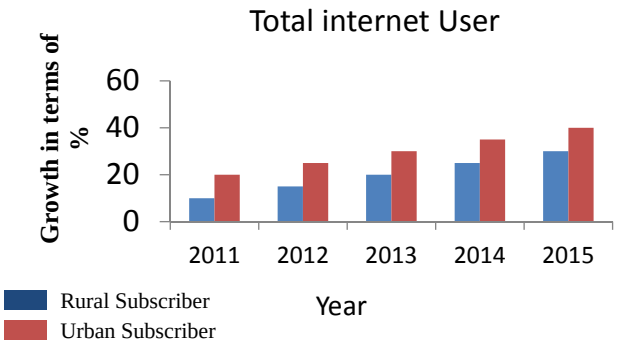
- The Indian market for e-book buyers forms the second largest e-Book market in the world.
- India is considered to having a huge potential owing to burgeoning middle class that speaks English aided with an increasing disposable income.
- Additionally, as Indian e-publishers producing content for Indian consumers, global e-publishers have started outsourcing their e-publishing service to Indian firms.

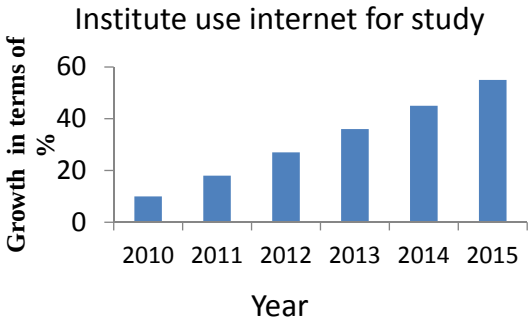


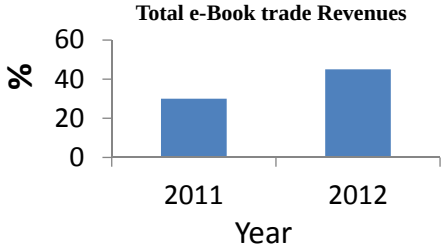
https://www.hindustantimes.com

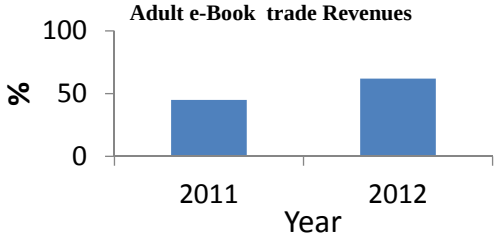
India

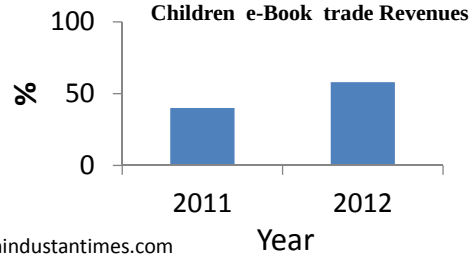
e-book users in India

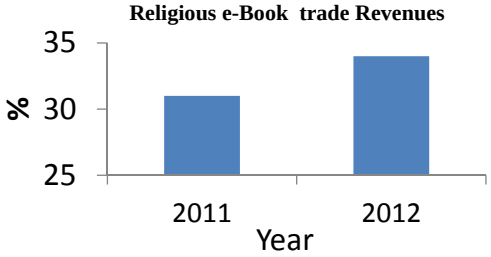










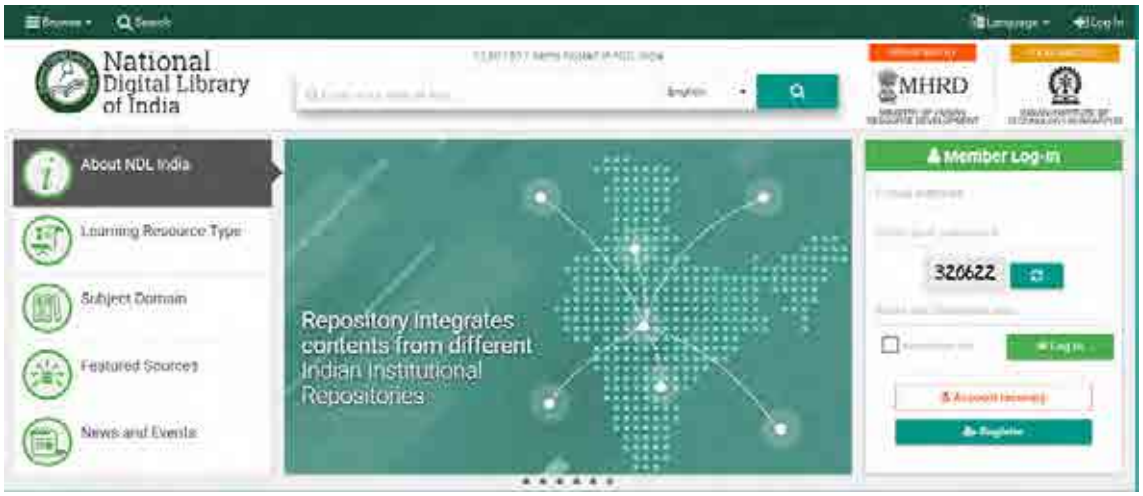


https://www.hindustantimes.com

India

e-book library of India

The **National Digital library of India** (**NDLI**) is a project under Ministry of Human Resource Development, India. The objective is to integrate several national and international digital libraries in one single web-portal. The NDLI provides free access to many books in English and the Indian languages.

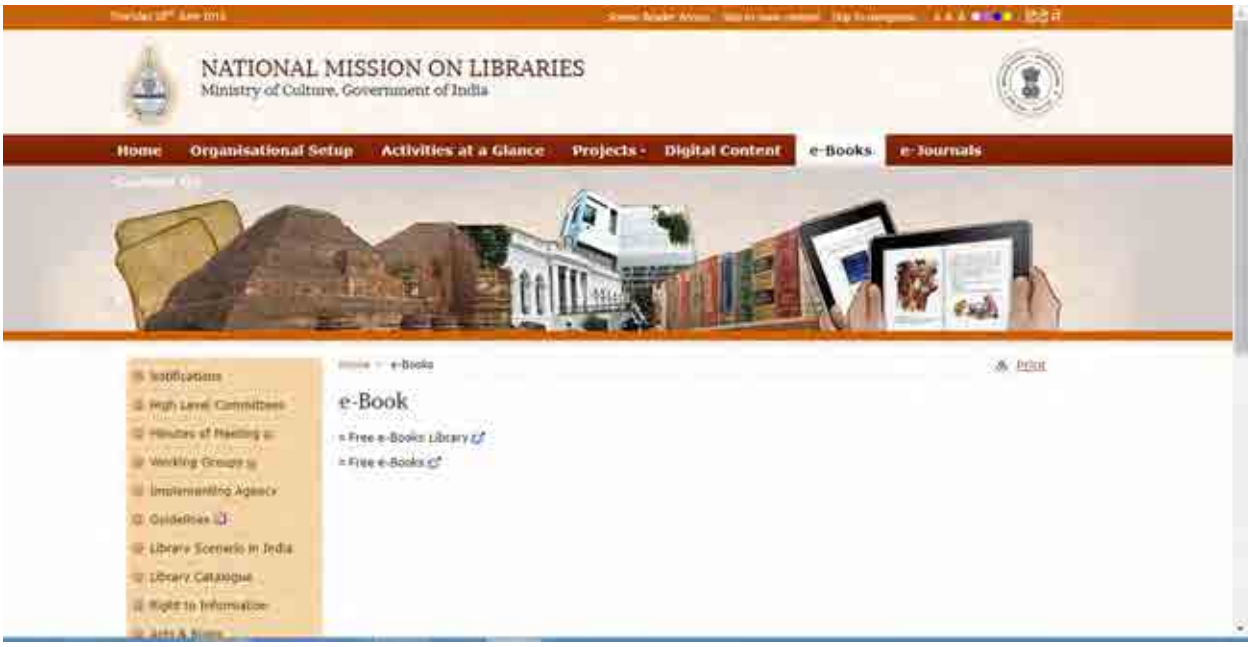


https://ndl.iitkgp.ac.in/

India

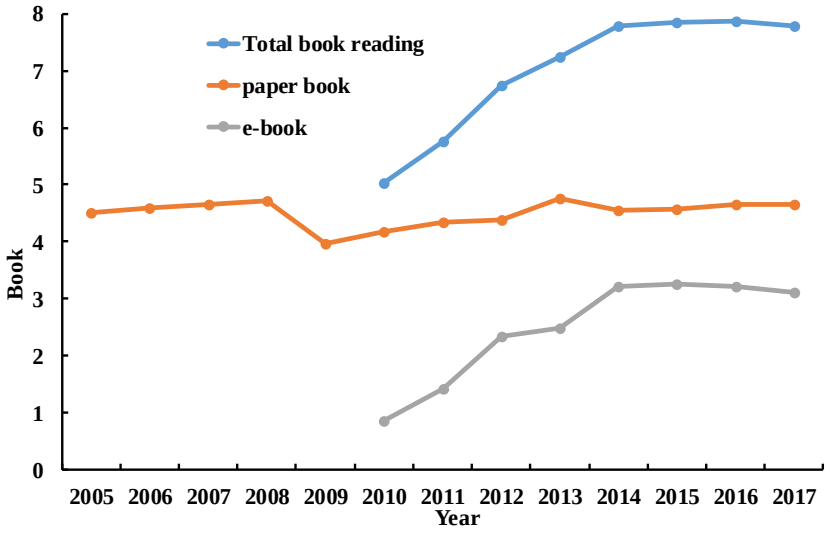
e-book library of India

The **National Mission on Libraries India**, an initiative of the Ministry of Culture under the Government of India, works to modernise and digitally link nearly 9,000 libraries across India to provide readers access to books and information.



http://www.nmlindia.nic.in/

Paper books and e-books market in China

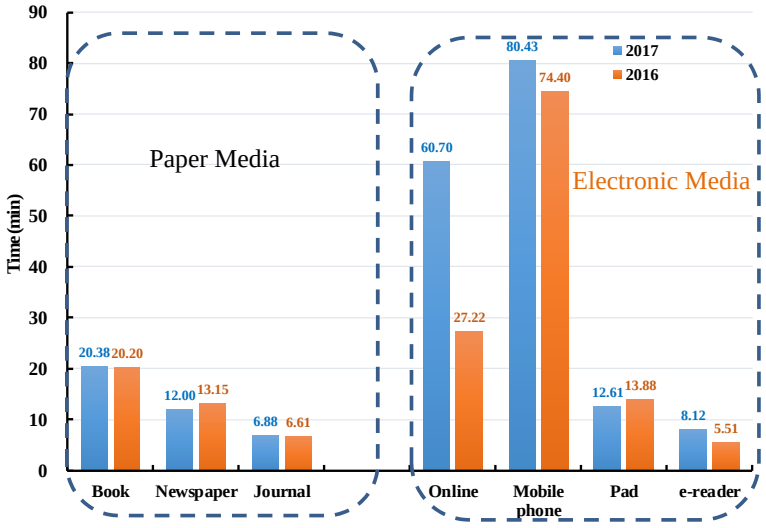


In 2017, the average Chinese per capita paper book reading was 4.66, and the per capita e-book reading was 3.12. Paper books are still more popular than e-books. However, in recent years, e-books contribute to the total reading growth.

Source: Chinese press and Publishing Research Institute,2018

China e-book users in China

Reading time per day



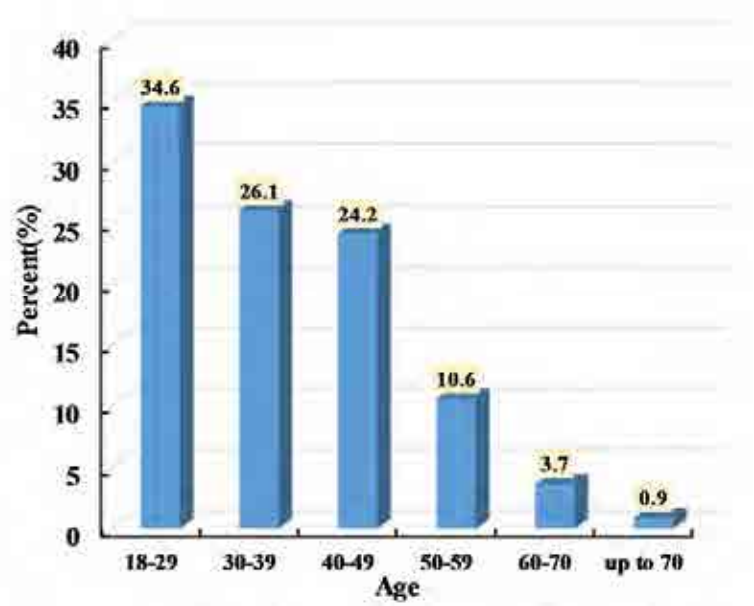
In the traditional paper media, the book reading time of adult Chinese people is about 20 minutes per day. In the new digital media, the per capita mobile phone reading in China is 80 minutes per day.

People tend to spend more time on digital reading.

Source: Chinese press and Publishing Research Institute,2018

China e-book users in China

Adult digital reading population distribution



It can be seen that 84.9% of adult digital reading readers in China are 18-49 years old.

Source: Chinese press and Publishing Research Institute,2018

China e-book library of China

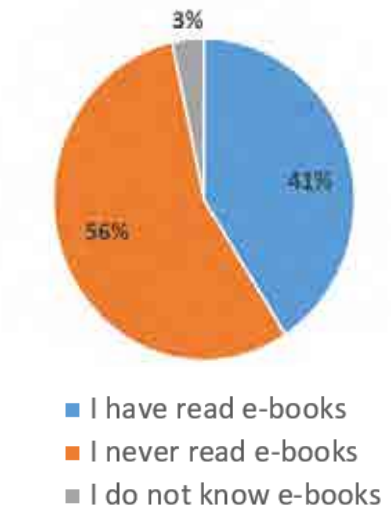
The National Library of China (NLC) serves as the repository of the nation's publications, a national bibliographic center, a national center for preservation and conservation of ancient books, as well as the national museum of ancient books.

Source: http://www.nlc.cn/newen/

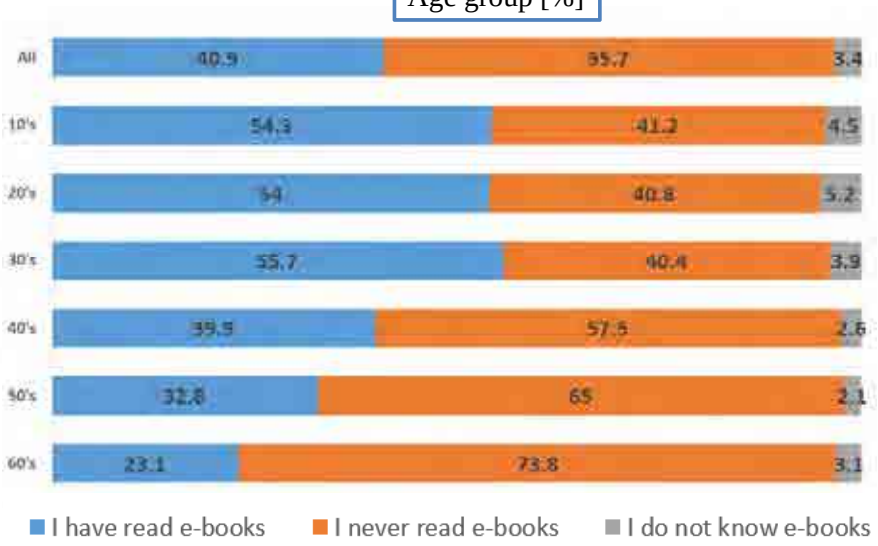
Future prospects

Cognitive usage of e-books

ALL [%]



Age group [%]



Base: Overall (n = 2,890)

According to a net survey on the recognition of e-books by "Macromill", they found that the recognition rate of e-books is about 97%. In addition, it was about 41% who used it.

By age group, people who have used e-books became graphs.

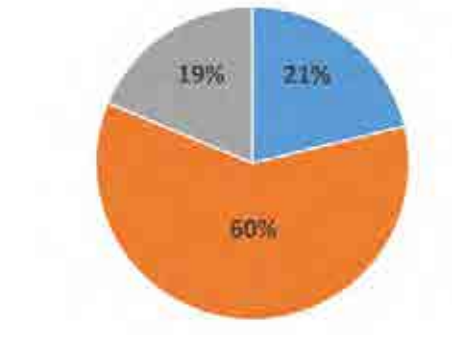
In other words, it turned out that the usage experience of e-books declined as the age increased.

https://honote.macromill.com/report/20160830/?cid=SL-PR

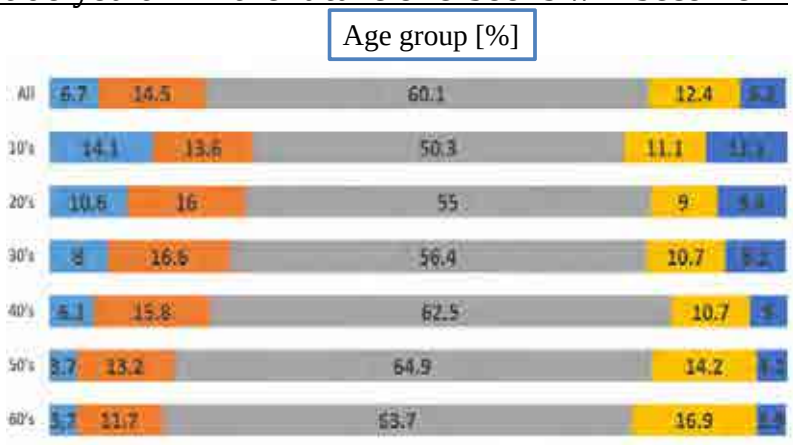
Future prospects

Forecast of e-books ～What do you think the future of e-books will become～

ALL [%]



Age group [%]



Base: Overall (n = 2,890)

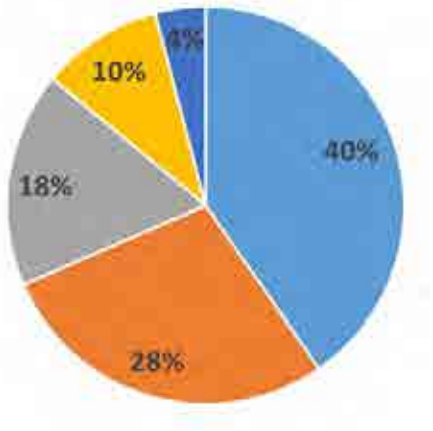
When “Macromill” also asked what you think about the relationship between future “e-books” and “paper books”, They found that about 21% think that “paper books replace e-books”. The tendency is higher as younger generation. Looking at the graph, 27.7% in teens , 26.6% in 20's, 24.6% in 30's, 21.9% in their 40s, 16.9% in their 50s and 15.4% in their 60s.

https://honote.macromill.com/report/20160830/?cid=SL-PR

Future prospects

Forecast of e-books ～Which do you like, e-books and paper books～

Base: Overall (n = 1,183)



On the other hand, they ask experienced users of e-books “which do you like “e-book” and “paper book?”, about 68 % of respondents said that they liked “paper books”.

Some people support “e-books” from the viewpoint of convenience, but they seem to have many people who support “paper books” in terms of legibility and preference.

https://honote.macromill.com/report/20160830/?cid=SL-PR

Future prospects

Forecast of e-books and paper books

Sales of e-books are growing, but it is found that there are more people who like paper books than e-books

Based on the above results, e-books will secure certain markets by taking advantage of its characteristics, but from the point of difficulty in reading and lack of satisfaction, it is considered that the age of exceeding printed books will not come for a while

https://tokyop.com/dbook_intro/index.html

https://www.irasutoya.com/2013/09/blog-post_4710.html

Environmental impact

What is Eco-friendly?

Having a beneficial effect on the environment or at least not causing environmental damage.

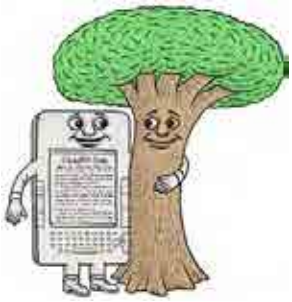
Based on some basic Googling (wikipedia and the like), I assumed the following:

- 1 average sized tree produces about 680kg (1500lbs) of paper.
- Harry Potter all 7 books together mass approximately 2.9kg (Amazon).
- The Amazon has sold 450 million copies, Harry Potter Books complete series.

Q:How many trees did it take to print 450 million copies of the latest Harry Potter?

Ans:

So a very rough estimate: (450,000,000 sets) * (2.9 kg/ set) = 1,305,000,000 kg of Harry Potter Books (1,305,000,000 kg) / (680 kg of paper/tree) = 1,919,000 trees



http://www.slate.com/articles/health_and_science/the_green_lantern

Result

- The most dramatic impact is a loss of habitat for millions of species
- Eighty percent of Earth's land animals and plants live in forests, and many cannot survive the deforestation (due to wood and paper products) that destroys their homes.
- Trees also help perpetuate the water cycle by returning water vapor to the atmosphere. Without trees to fill these roles, many former forest lands can quickly become barren deserts.

1,919,000 trees

↓

450 million Harry Potter paper Books

2TB hard Drive

↓

450 million Harry Potter e-Books

Lets See how Ecofriendly?

https://www.123rf.com/photo_6157620_a-cartoon

Environmental impact

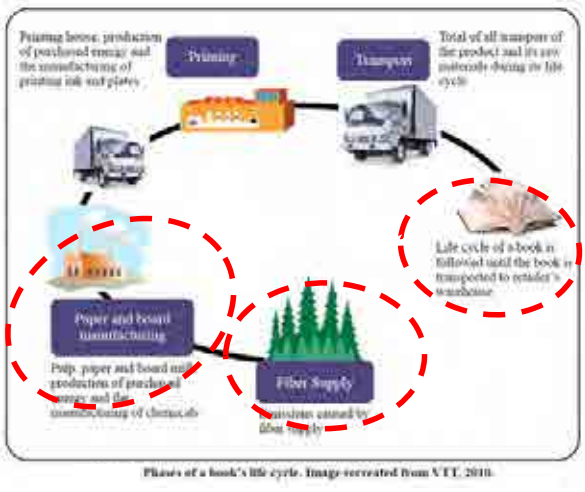
Parameter which is used by different researcher to study the impact of Paper Books & e-books on environment .

- Material Inputs
- Water inputs
- Energy Intensity
- Air emission
- Water emission
- Solid waste

http://www.edushi.com/zixun/info/2-12-n4404965.html

Environmental impact

Paper book system



Phases of a book's life cycle. Image recreated from VTT, 2010.

Source：Dowd-Hinkle, Dealva Jade, "Kindle vs. Printed Book An Environmental Analysis" (2012). Thesis. Rochester Institute of Technology.

e-book system

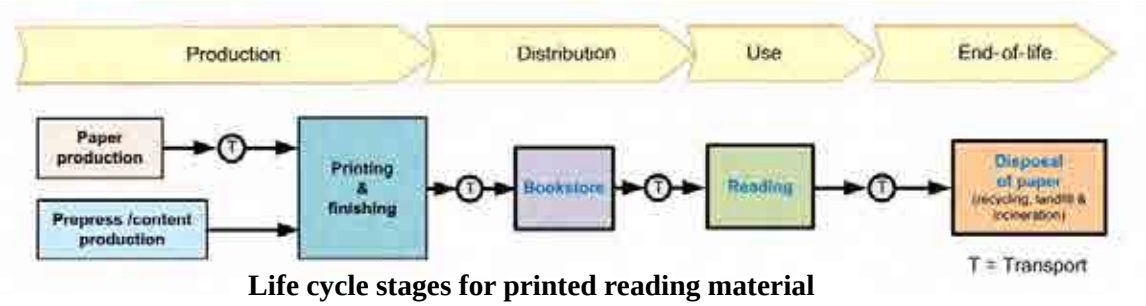
Source：https://www.keyoung.hk/ebook-conversion

There are three stages in the life of paper that have the greatest negative impact on the environment: harvesting the trees, processing the wood into pulp, disposal at the end of its life.

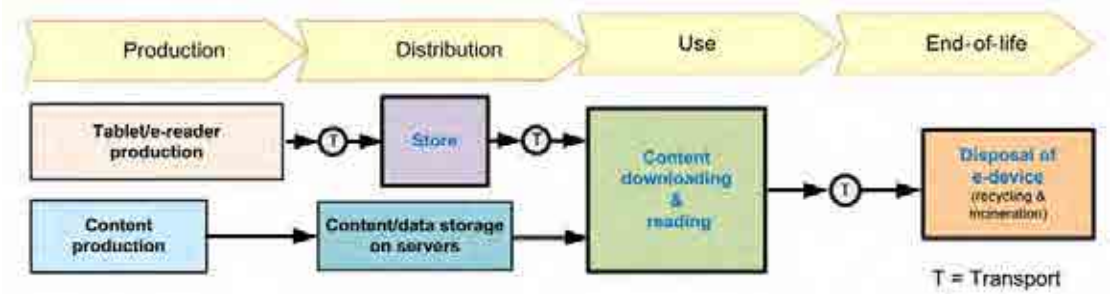
Environmental impact

Life Cycle Assessment (LCA)

Life Cycle Assessment (LCA) is a technique to evaluate the environmental impacts associated with the life of a product (or service), from cradle to grave.



Life cycle stages for printed reading material

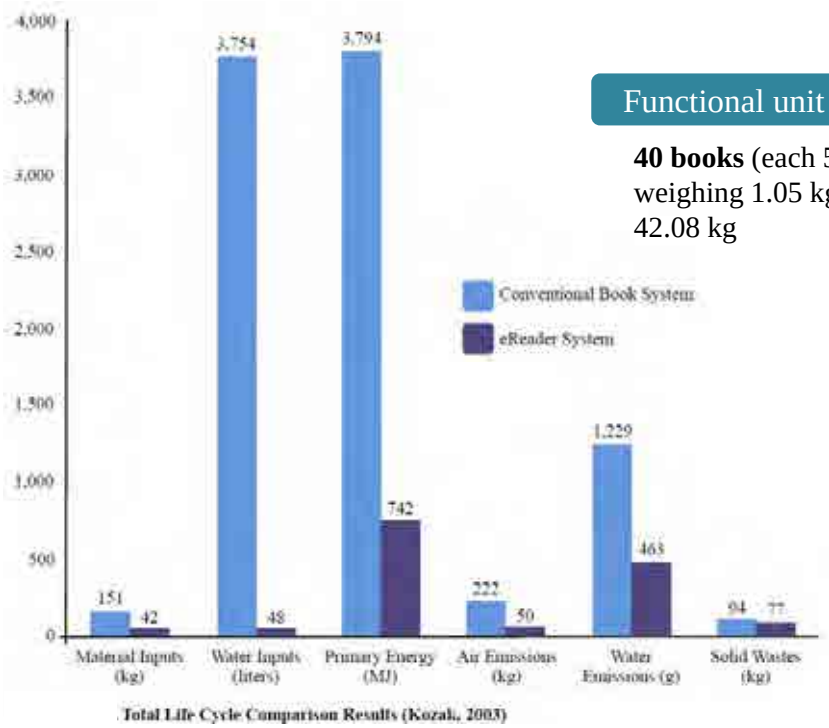


Life cycle stages for e-readers

Source：Clean Techn Environ Policy (2015) 17:803–809

Environmental impact

Research 1



Total Life Cycle Comparison Results (Kozak, 2003)

Functional unit

40 books (each 500 page), each weighing 1.05 kg, Total weight 42.08 kg

The paper book system required more raw materials and water inputs, consumed more energy, and produced more air and water emissions and solid wastes than the e-Reader system.

Source：Dowd-Hinkle, Dealva Jade, "Kindle vs. Printed Book An Environmental Analysis" (2012). Thesis. Rochester Institute of Technology.

Environmental impact

Research 1

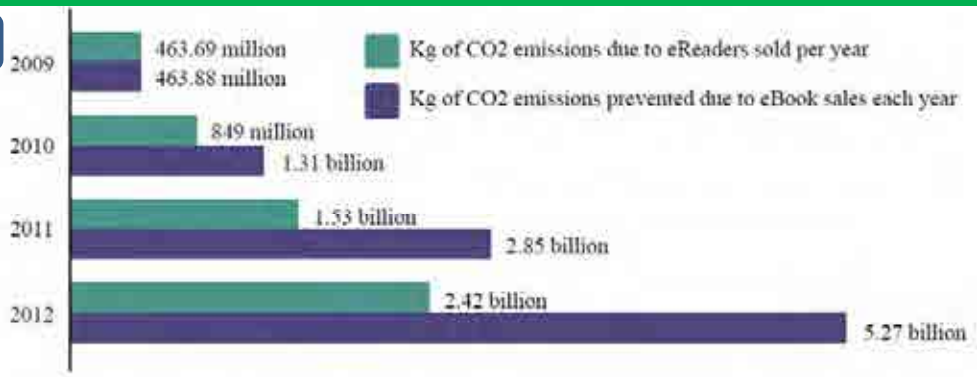


Figure 10. Projected change in CO_2 emissions due to eReader sales across the globe (Ritch, 2009)

The data compiled in this report looked specifically at CO_2 emissions and found that e-books prevent the release of more CO_2 than they release per year.

. Emissions of various reading devices (Ritch, p. 6, 2009)(Kozak, p. 91, 2003)

Estimated emissions per unit		
	Ritch (2009)	Kozak (2003)
Newspaper	0.62 kg	-
Magazine	0.95 kg	-
Book	7.46 kg	60 kg
iPhone	55 kg	-
Kindle	168 kg	218 kg

Source: Dowd-Hinkle, Dealva Jade, "Kindle vs. Printed Book An Environmental Analysis" (2012). Thesis. Rochester Institute of Technology.

Environmental impact

Research 2

Maria E. Environmental impact of printed and electronic teaching aids, a screening study focusing on fossil carbon dioxide emissions, 2009

Functional unit: Use of teaching aids (books) for five years for 5,000 pupils per year, each book weighing 0.8 kg. The pupils reside in six different cities in Norway.

Emissions of fossil carbon dioxide (in kg) from the studied printed textbook scenarios. The contributions from the different processes as well as the total amount are shown.

	Pulp and Paper, Direct emissions	Pulp and Paper, Bought electricity	Transp, Paper	Printing, Energy	Printing, Plate	Printing, Ink	Distrib, Books	Use	Waste mngmt	Total
Printed textbook (low energy printing)	1170	129	91	334	13	27	77	0	240	2080
Printed textbook (high energy printing)	1170	129	91	871	13	27	77	0	240	2620

The results show that the pulp and paper production as well as the printing process contribute significantly to the total impact on global warming of printed textbooks.

Environmental impact

Research 2

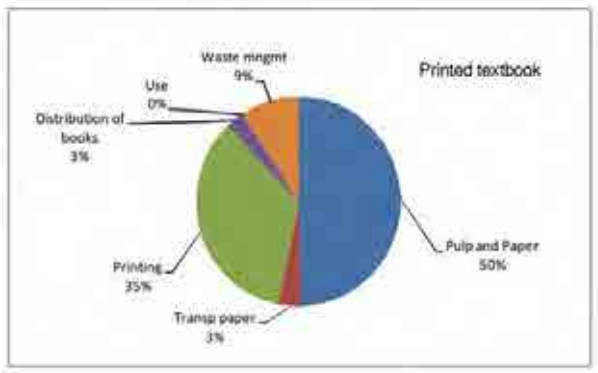
Emissions of fossil carbon dioxide (in kg) from the studied web based electronic teaching aid scenarios. The contributions from the different processes as well as the total amount are shown.

	Formatting	Use of internet, Backbone	Use of internet, Access Techn	Distrib, Equipm	Use	Computer prod	Screen prod	Waste mngmt	Total
Web based electronic teaching aid (laptops)	0.75	31	0.38	169	8770	14980	0	-185	23800
Web based electronic teaching aid (desktops & screens)	0.75	31	0.38	1070	29870	25530	10180	555	67200

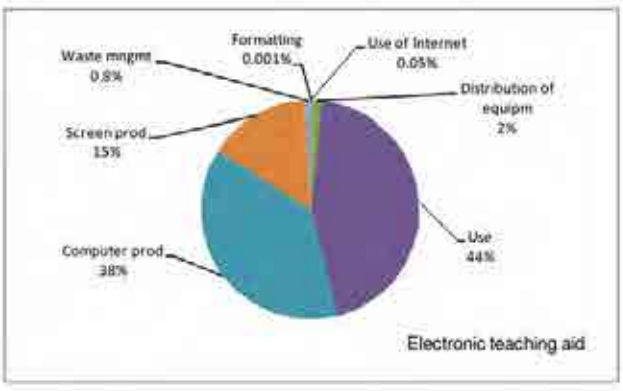
For the web based electronic reader, the production of computer equipment for the users and the use phase contribute in a significant way to the total impact of global warming of this type of product.

Environmental impact

Research 2



The contribution from the different life cycle steps of the studied printed textbook (high energy printing scenario) when it comes to fossil carbon dioxide emissions.



The contribution from the different life cycle steps of the studied web based electronic teaching aid (high energy scenario with desktops & screens) when it comes to fossil carbon dioxide emissions.

The study shows that the environmental impact of a web based electronic teaching aid is approximately 10 times higher than that of a printed textbook.

Environmental impact

Research 3

Brett Cohen. A life cycle assessment of e-books and printed books in South Africa, 2016.

Functional unit: reading 21 books. This figure represents the total number of books required for a four-year commerce degree at a local university.

Characterisation factor name	*Unit*	*Base case print system*	*Base case digital system*	*IRP energy mix scenario print system*	*IRP energy mix scenario digital system*	*No. of users for print system to equal or better digital system*
Global warming potential	kg CO_2 eq	132.0	375.0	122.0	33.1	3
Ozone depletion potential	kg CFC-11 eq	0.00000512	0.00000118	0.00000557	0.00000139	7
Terrestrial acidification potential	kg SO_2 eq	0.724	0.289	0.633	0.247	2
Freshwater eutrophication potential	kg P eq	0.00935	0.0210	0.00847	0.0206	1
Marine eutrophication potential	kg N eq	0.0951	0.0244	0.9935	0.0237	6
Human toxicity potential	kg 1,4-DB eq	8.38	5.21	8.19	5.12	4
Photochemical oxidant formation	kg NMVOC	0.629	0.166	0.584	0.145	3
Particulate matter formation potential	kg PM10 eq	0.276	0.0892	0.253	0.0784	3
Terrestrial ecotoxicity potential	kg 1,4-DB eq	0.0199	0.00246	0.0198	0.00242	
Freshwater ecotoxicity potential	kg 1,4-DB eq	0.0629	0.206	0.0626	0.206	1
Marine ecotoxicity potential	kg 1,4-DB eq	0.0829	0.272	0.0816	0.271	1
Ionising radiation potential	kBq U^{235} eq	3.27	1.36	4.23	1.80	3
Agricultural land occupation potential	m^2a	462.0	0.557	462.0	0.547	
Urban land occupation potential	m^2a	4.50	0.249	0.249	0.237	
Natural land Transformation Potential	m^2	0.0347	0.00117	0.00117	0.00113	
Water depletion potential	m^3	193.0	86.2	86.2	85.7	4
Mineral resource depletion potential	kg Fe eq	0.465	15.2	15.2	15.2	1
Fossil resource depletion potential	kg oil eq	32.2	9.58	9.58	8.47	3

Environmental impact

Research 3

Results of cumulative energy demand analysis

Print system			*Digital system*		
Process	*Base case energy (MJ)*	*IRP energy (MJ)*	*Process*	*Base case energy (MJ)*	*IRP energy (MJ)*
Pulpwood	31	31	iPad production	251	251
Pulp	19	18	iPad distribution transportation	1	1
Paper	617	597	Personal transportation	41	41
Paper distribution transportation	96	96	E-book formatting	0	0
Printing	594	563	E-book downloading	2	2
Personal transportation	166	166	E-book reading	176	153
Waste management	4	4	Waste management	0	0
Total	1525	1474	Total	473	450

It shows that the print system requires approximately three times more energy (1525 MJ) to offer the same service as the digital system (473MJ).

The findings of this study suggest that the environmental impact of e-books read on iPads is less than that of reading printed books.

Conclusion

- Paper books and e-books both serve its purpose for entertaining reading lovers.
- In point the of eco-friendly e-books are comparatively good from paper book as it less disturb the biodiversity.
- For making paper books lots of forest get destructed and it effect environment, animal as it destroyed their ecological niche.
- e-books are more user friendly regarding caring, sharing, reading.
- e-books won't replace paper books because people love both. e-books may be selling more than paper books but it won't ever replace paper books.

Discussion Topics

1. Do you think the e-books will replace the paper books in the near future?
2. For teenager, do you recommend electronic media for reading? And why?

Thank You

https://www.google.co.jp/search?q=save+green+lungs+of+earth+tree&tbm