Global Science Coference 2024
Global Conference among High School students 2024

NAGOYA UNIVERSITY

Affiliated Upper and Lower Secondary Schools, School of Education, Nagoya University

Global Conference 2024

Date: 7th December (Sat) – 8th December (Sun)

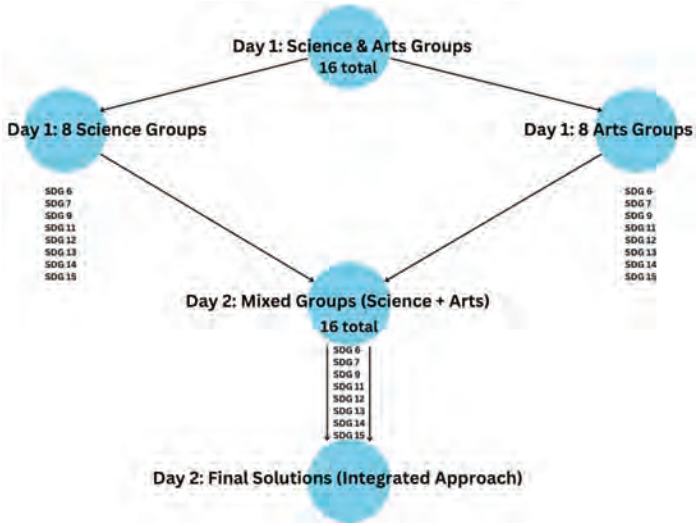
Time: 9:30 – 17:00

Aim: We live in an uncertain world filled with complex global challenges that no single person or country can solve alone. Now is the time for the younger generation to pave the way for a *NEW STANDARD*. At Nagoya University, we come together—crossing borders and academic disciplines—to share ideas for a better future. It is young people like you, from all around the globe, who have the power to create a brighter, more sustainable world.

Content:

Students will share ideas on the assigned SDGs in small groups, divided into science-based groups and arts-based groups. Each group will consist of students from different countries.

- **Day 1:**
  - **Science-based groups** will approach the issue using methods and solutions grounded in their scientific and technical background.
  - **Arts-based** groups will focus on perspectives rooted in the humanities, social sciences, and creative disciplines.
- **Day 2:**
  - On the second day, the groups will be shuffled so that each new group consists of a mix of both **science-based** and **arts-based students**.
  - In these new, mixed groups, students will **share their findings** from Day 1 and work together to generate **a comprehensive solution** that integrates both the **science and arts perspectives**.
  - The goal is for the students to collaborate and create **a multifaceted solution** to the problem, taking into account both scientific innovation and artistic expression.
  - Together, they will prepare and present their ideas to the rest of the groups.



Location:

- **Day 1 (Morning Session):** All students will gather at Sakata Hirata Hall.

- **Day 1 (Afternoon Session):**
  - Science groups will remain in Sakata Hirata Hall.
  - The Arts group will move to ES Hall.
- **Day 2:** All students will gather at Noyori Conference Hall.

The number of IParticipants:

- Japanese Students 56
  Affiliated School of Nagoya university 23 Kinjo gakuin 11 Meijo 9
  Affilizted school of Aichi University of Education 3 Yokkaichi 2 Kano 2
  Handa 1 Ichinomiya 3 Niigata sanjo 2
- International high school students 30
  Thailand 4 Italy 2 Germany 2 Canada 1 Denmark 1 Vietnam 1 Mongol 1
  Argentina 1 Myanmar 1 Turkey 1 Hungary 1 Slovakia 1 Finland 1
  Spain 1 India 1 Columbia 1 UK 1 USA 2 Austria 3 Pakistan 1
  Island 1 Indonesia 1

The number of Teaching Assistants (TAs):

- International students from Nagoya University 29

Language:

- English

Schedule:

Date	Time	Activity	Location
Saturday, 7th	9:30	Reception	Sakata Hirata Hall
	10:00	Keynote Speech	Sakata Hirata Hall
	11:30	Lunch	-
	13:00	Discussion I	
		- Science Group	Sakata Hirata Hall
		- Arts Group	ES Hall
	17:00	Closing	Sakata Hirata Hall
Sunday, 8th	9:30	Reception	Noyori Conference Hall
	10:00	Discussion II	Noyori Conference Hall
	14:00	Presentations	Noyori Conference Hall
	16:00	Comments	Noyori Conference Hall
	17:00	Closing	Noyori Conference Hall

Message

Dr. Wai Kian TAN
Associate Professor, Liberal Arts and Sciences
Toyohashi University of Technology

I would like to extend my sincere gratitude to Sankoda Sensei and the organizing team for inviting me to deliver the keynote speech at the purposeful and eventful 2024 Global Science Conference. It was an honour to be part of such a prestigious and important event and to share my thoughts with such an engaged and passionate group of young people, who, without a doubt, will shape the future of our world's sustainability. I would also like to take this opportunity to thank the coordinator Ms. Srna Zafirovska and teaching assistants, who contributed immensely by overseeing, guiding, and cultivating the importance of the Sustainable Development Goals (SDGs) among the high school participants from various countries.

Knowledge is vital for technological advancement and modernization, but without wisdom and altruism, achieving the SDGs would be a significant challenge. In a world facing climate change, global conflicts, health, and economic crises, awareness and wisdom can play pivotal roles in creating a sustainable future. From the perspective of natural sciences, with the proper and mindful use of technology, the creation of efficient clean energy and sustainable technologies can propel us toward the SDGs. From the perspective of the humanities, a mindful, sustainable approach and the instillation of pragmatic wisdom can forge more effective efforts and outcomes toward building a new sustainable culture and society. Therefore, science and the humanities play interconnected and crucial roles in achieving the SDGs. Remember, "***Science without civilization, without wisdom, is a menace.***"

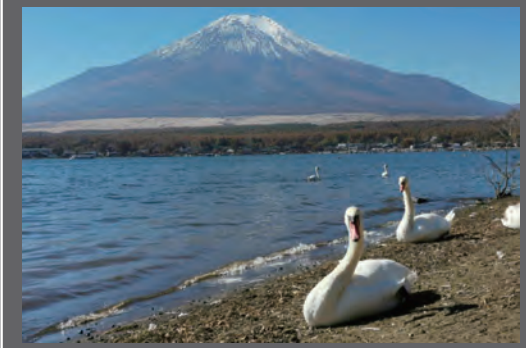
It was inspiring to see youth participants from both streams, with various national backgrounds, come together with a shared desire to learn and contribute to future sustainability, which aligns with the saying, "***Leave No One Behind***."

I would be grateful if my lecture leaves a small but lasting impact and provokes a constant inquiry toward wisdom for the achievement of the SDGs. The topics I discussed only scratch the surface, and there are no limits to what you all can contribute and achieve, as the possibilities are endless. "***No effort is too small***" and I hope each of you finds your own way to contribute to sustainability.

I hope you all had fun learning, networking with new friends during the conference, and beginning your own journey toward creating a sustainable future. Lastly, I would like to share a proverb: "***The best time to plant a tree was 20 years ago. The second-best time is now.***" Let's act now.

Keynote Speech

2024 Global Science Conference




レガシーと共でる
村の未来創造
TOKYO 2020 OLYM
amanaka

Brief lecture outline

- Awareness toward co-existence with nature
  - How real is climate change?
- Global issues leading to SDGs creation
- What role can all of us play toward achieving SDGs?
  - Understanding current situation
  - Small actions that we can do contribute
- How understanding nature and materials science could contribute to sustainability


What is sustainability

Global warming set to wipe at least 10% from GDP
https://esgclarity.com/global-warming-set-to-wipe-at-least-10-from-gdp/

How real is climate change?

- The evidence that we are witnessing:
  - Global temperature rise
  - Warming ocean, rapid melting of arctic sea ice
  - Rising sea level
  - Ocean acidification

- https://climate.nasa.gov/evidence/

You may check out the interactive galleries provided by NASA

How familiar are you with SDGs? Take a moment to go through every goal and think how does it relate to you.

https://sdgs.un.org/goals

From Japan perspectives

Japan is ranked 19th out of 163 countries in terms of SDGs achievement according to the Sustainable Development Report 2022.

18th in 2024.

Try to guess which countries are at the top of the list???

Reference:
https://dashboards.sdgindex.org/rankings

Rank	Country	Score	Performance by SDG
1	Finland	86.35	
2	Sweden	85.70	
3	Denmark	85.00	
4	Germany	83.45	
5	France	82.76	
6	Austria	82.55	
7	Norway	82.23	
8	Croatia	82.19	
9	United Kingdom	82.16	
10	Poland	81.69	
11	Slovenia	81.34	
12	Czechia	81.26	
13	Latvia	80.99	
14	Spain	80.70	
15	Estonia	80.46	
16	Portugal	80.22	
17	Belgium	80.04	
18	Japan	79.87	
19	Iceland	79.54	
20	Hungary	79.53	

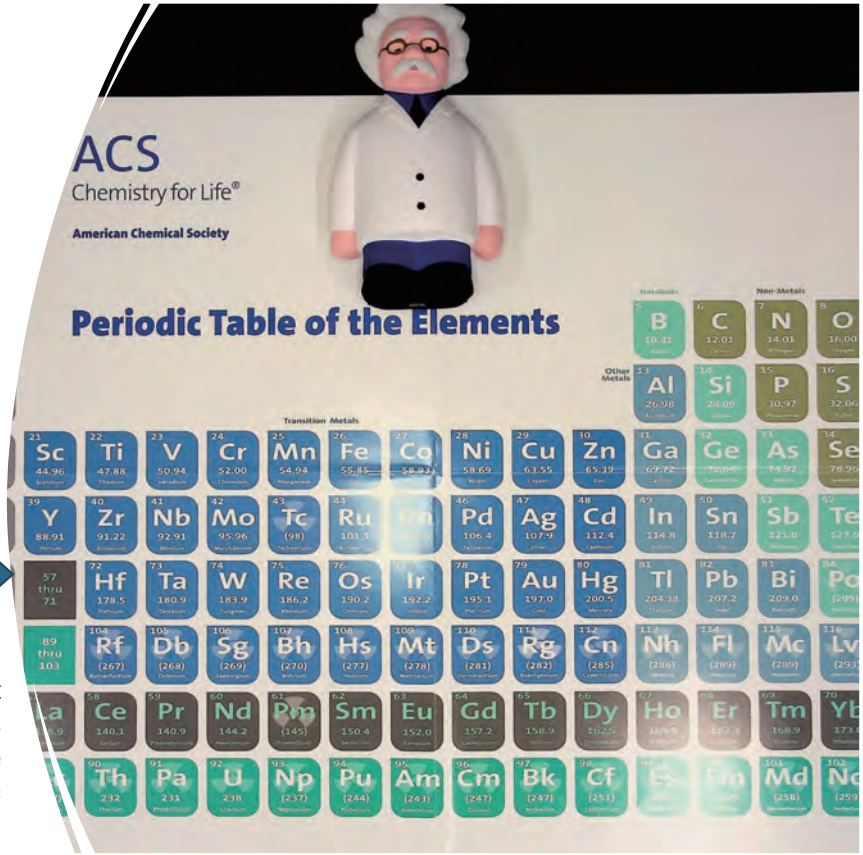
～環境・エネルギー材料～
Environmental and energy materials perspectives

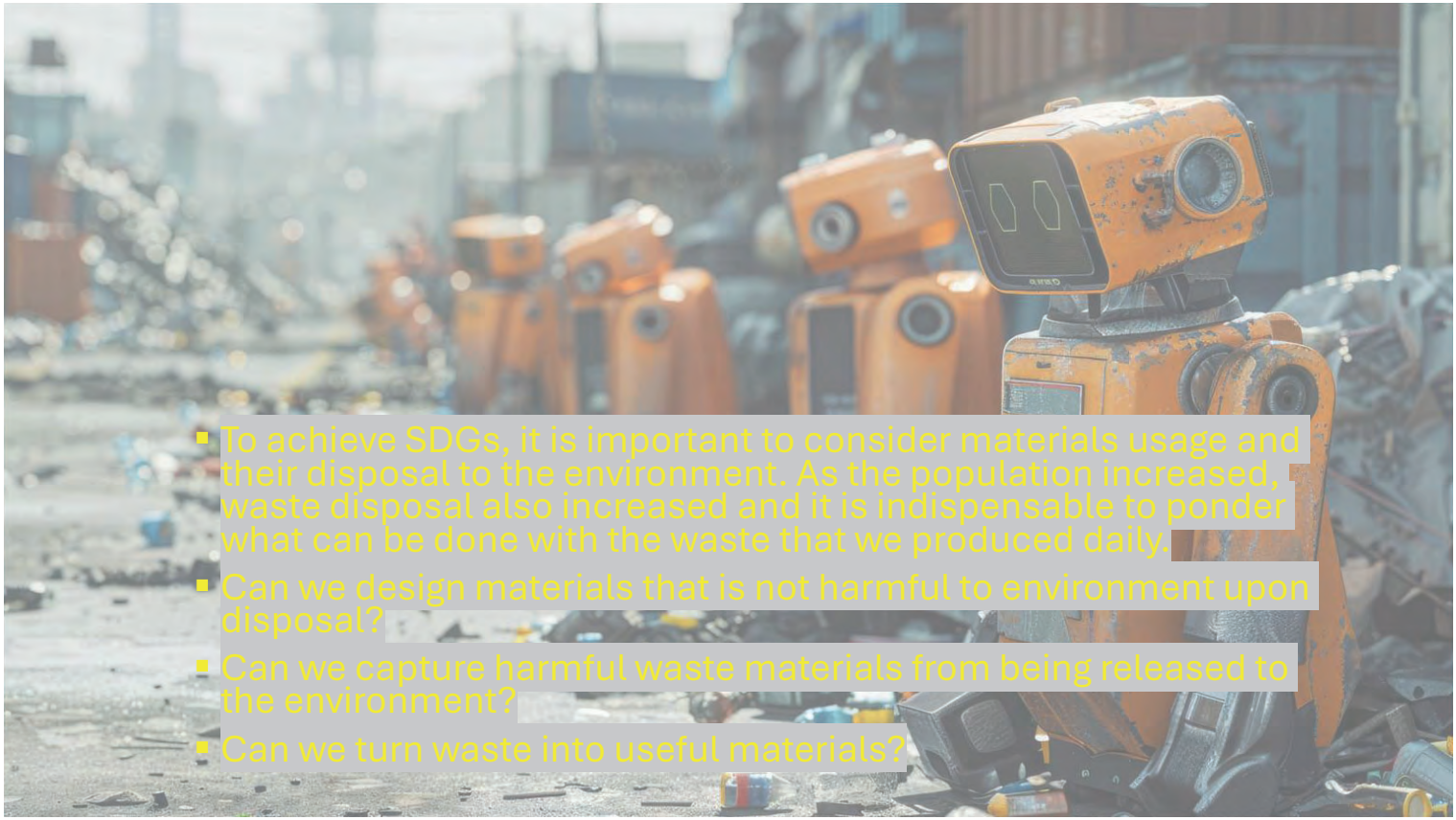
- For today's lecture, focus will be on environmental and energy materials through SCIENCE

How can learning these help with co-existence with nature???

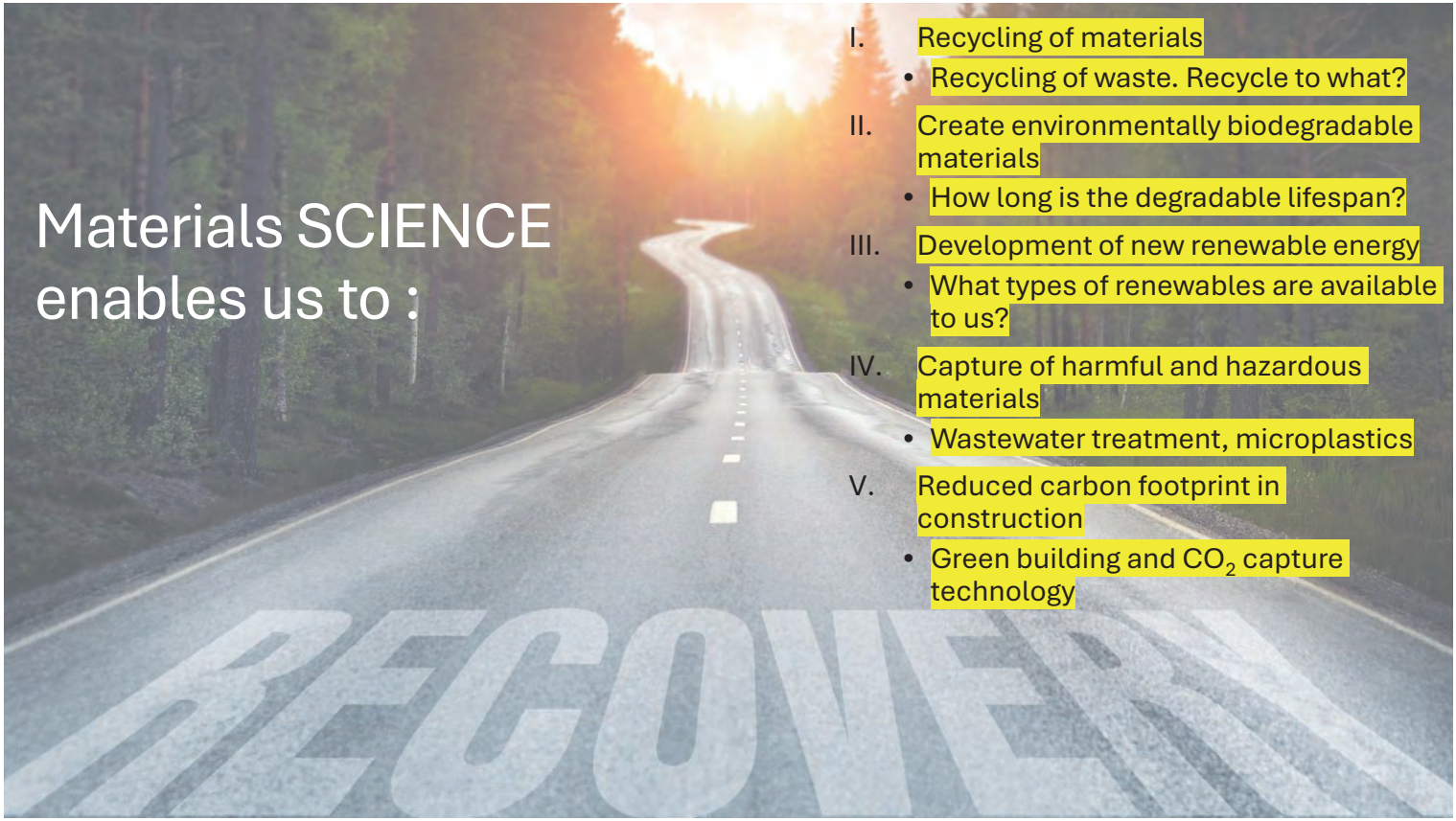
By learning and understanding materials, design of advanced materials can be achieved

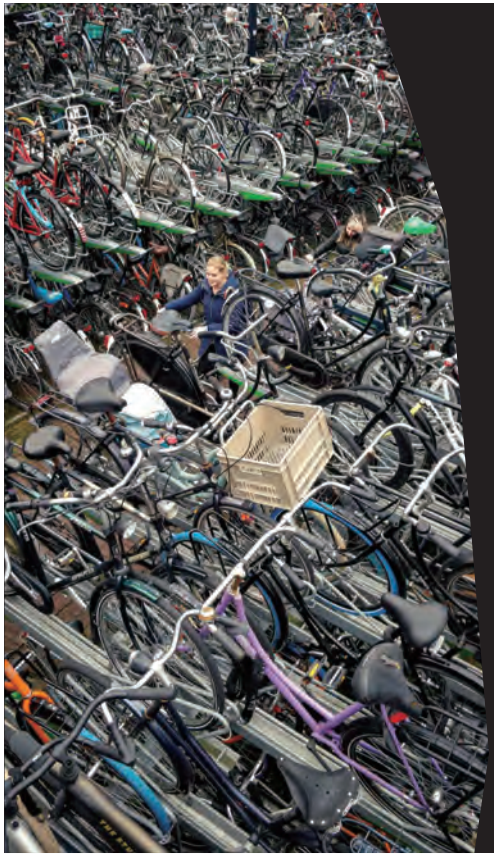
I am sure you have learned about periodic table that consist of all the materials known to us. As it is impossible to cover all materials, examples will be selectively chosen to provide you with all the basic concepts of materials science.





- To achieve SDGs, it is important to consider materials usage and their disposal to the environment. As the population increased, waste disposal also increased and it is indispensable to ponder what can be done with the waste that we produced daily.
- Can we design materials that is not harmful to environment upon disposal?
- Can we capture harmful waste materials from being released to the environment?
- Can we turn waste into useful materials?


Materials SCIENCE enables us to :
I. Recycling of materials
• Recycling of waste. Recycle to what?
II. Create environmentally biodegradable materials
• How long is the degradable lifespan?
III. Development of new renewable energy
• What types of renewables are available to us?
IV. Capture of harmful and hazardous materials
• Wastewater treatment, microplastics
V. Reduced carbon footprint in construction
• Green building and CO_2 capture technology



How about cycling?

Reduce carbon footprint

(I) Recycling of materials
Recycling of waste. Recycle to what?

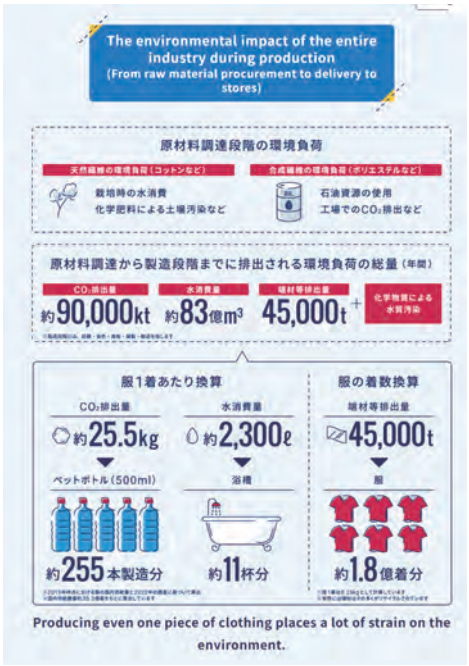
- Recycle back into the same materials for reuse.
- Ex: aluminium, polyethylene terephthalate (PET).

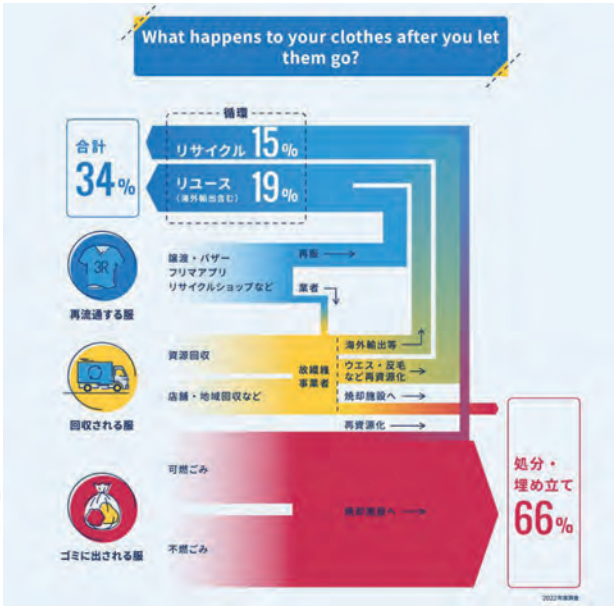
Aluminum

polyethylene terephthalate (PET)


12 RESPONSIBLE CONSUMPTION AND PRODUCTION
SEGREGATE YOUR WASTE
HOW TO MANAGE YOUR WASTE AT HOME
ORGANIC
PAPER
PLASTIC
GLASS
METAL
NON RECYCLABLE
E-WASTE
SPECIAL
Manage, separate and recycle your waste


12 RESPONSIBLE CONSUMPTION AND PRODUCTION
UPCYCLING





Source: https://www.env.go.jp/policy/sustainable_fashion/

Upcycling

UNIQLO PRE-OWNED CLOTHES PROJECT by RE.UNIQLO

Getting more life out of LifeWear.

Once you've made the most of your clothes, it's time to recycle. RE.UNIQLO is working towards a circular society by selling pre-owned clothes. Items collected by UNIQLO are carefully sorted, washed and dyed, giving them added value. Suited for all ages, these pre-owned treasures are more than just a re-newed item for your wardrobe, they reduce clothing waste.

We've launched the RE.UNIQLO STUDIO so you can enjoy wearing your UNIQLO clothes for longer.

Your UNIQLO clothes have a long life ahead of them. We're creating something positive for the future by keeping UNIQLO items in circulation, maximizing all the possibilities our clothes have to offer. This is RE.UNIQLO STUDIO.

Repair your favorite clothes so you can keep wearing and loving them. Remake them into fresh new items. Donate clothes to people in the community who really need them. Well-worn clothes are recycled and turned into materials for new clothing and resources. By creating new jobs for clothes that have run their course, we're investing in tomorrow. RE.UNIQLO STUDIO is here to make the RE.UNIQLO dream a reality.

REPAIR
Carefully repair damaged areas so your favorite clothes can be worn and loved for a long time.

REMAKE
Remake your UNIQLO clothes into fresh new items or customize them however you like.

REUSE
Collect clothes that are no longer worn and donate them to people in the community who need them.

RECYCLE
Unwearable clothes are collected and used as raw materials or recycled into materials for new clothing and energy sources.

Source: https://www.uniqlo.com/jp/en/contents/sustainability/planet/clothes_recycling/re-uniqlo/studio/


2
ZERO
HUNGER
12
RESPONSIBLE
CONSUMPTION
AND PRODUCTION

(I) Recycling of materials: Recycled into other useful materials.

Especially using waste materials in a **“Waste-to-wealth”** concept.

Recycling of disposed waste for different kind of applications such as energy storage, nanomaterials, biomedicals, biomass, etc.

What kind of waste could you think of?


eggshell


Steel slag

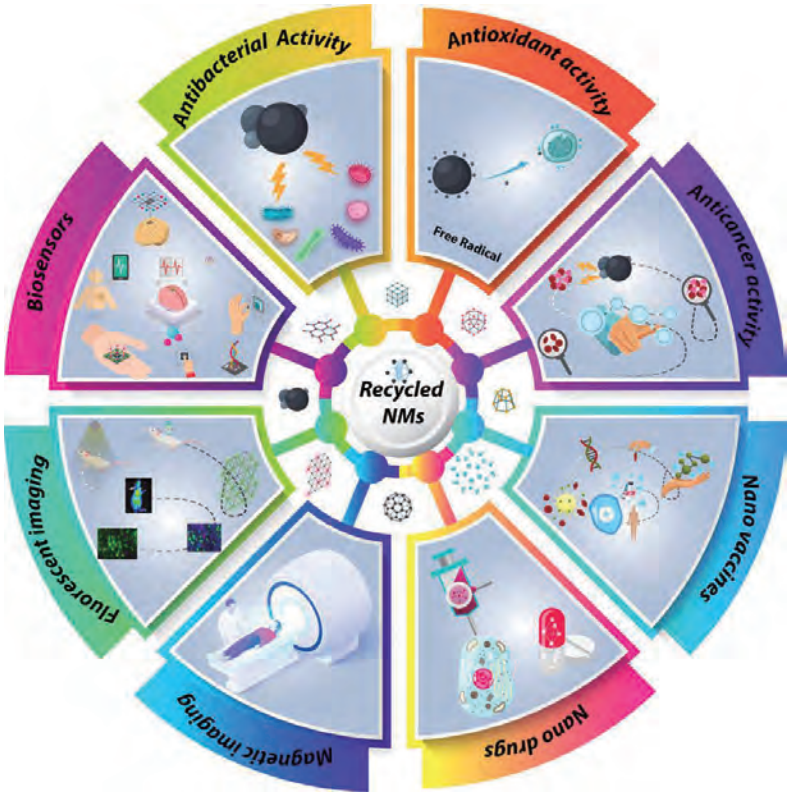

Chicken skin


Crab shell


Rice husk

Waste-to-wealth

Processing of wastes into useful materials is gaining attention. Through materials science, fabrication of carbon-based materials (carbon nanotubes, graphene) enabled fabrication of useful nanomaterial composites.



Nanotechnology Reviews, 2021, **10**, 1662-1739. https://doi.org/10.1515/ntrev-2021-0099

One of the examples in Japan

- Turning waste into useful resources.
- Tottori is a place where a large volume of crab is consumed and for distribution around Japan.
- Chitin are extracted from crab shells for various applications.

Chitin or
Chitin nanofiber

https://www.ntv.co.jp/englishnews/crab_season_opens_in_tottori/

Tottori University, Prof. Shinsuke Ifuku

https://asia.nikkei.com/Business/Technology/A-Tottori-startup-is-turning-crab-shells-into-nano-materials

ENVIRONMENT

The Japanese way of recycling waste

Firms seek to harness comprehensive trash-sorting system for chemical production

by ***Katsumori Matsuoka, special to C&EN***

July 22, 2024 | A version of this story appeared in **Volume 102, Issue 22**

Credit: Shutterstock

Trash sorting and recycling are practiced rigorously in Japan.

Garbage sorting is a well established ritual in Japan that few question, despite the time and effort involved. A typical resident of a major city has Mondays and Thursdays as options to take combustible garbage to a designated collection site. Tuesdays are for metal cans and polyester bottles, Wednesdays for newsprint and other recyclable paper, and Saturdays for other plastic containers. On Sundays, all trash stays home.

Japanese citizens are generally accepting of these rigid trash-sorting guidelines. Their willing participation has inspired planners to think about innovative ways to mine this waste. As early as 2003, Japan was converting used plastics into ammonia. Now, despite **setbacks in the US** and elsewhere, more and more Japanese companies are aiming to use household waste to produce basic chemicals like hydrogen, ethanol, and ethylene.

> **"Our process uses microorganisms that exist in the stomachs of rabbits."**
>
> — ***Satoshi Koma,*** *head of corporate new business development in the biorefinery group, Sekisui Chemical*

Source: https://cen.acs.org/environment/Japanese-way-recycling-waste/102/i22

(II) Biodegradable plastics

- Petroleum-based plastics: poor decomposability (remain in environment for decades)
- Slow decomposition into microplastics causes pollution.
- Microplastics pollution to the sea is also creating health issues through the food chain.

Nano/Microplastics→ fish→ human

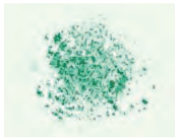
- Although there are studies on the effect on microplastics, nanoplastics (measuring less than 1 micrometer) are hard to be detected and less studies were conducted.
- One solution is to shift to <u>biodegradable plastic</u>.

Trees & plants

Photosynthesis

Degradation triggered by heat, UV light and/or mechanical stress

H_2O, CO_2 & biomass



Fertilizers

- Non-biodegradable (petroleum-based) plastics will remain for more than 50 years.
- Bio-degradable plastic will decompose in a few months (duration depending on composition).
- Decomposed biodegradable plastics act as fertilizer for trees and plants.

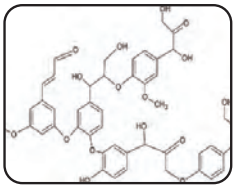
Examples of biopolymers

Natural polysaccharides:

Cellulose

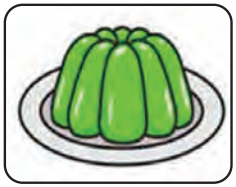
Anionic polysaccharides:

Alginate



Polyphenols:

Lignin



Polypeptides:

Gelatin

Cationic polysaccharides:

Chitosan

(III) Development of new renewable energy

- Renewable energy (solar cell or photovoltaic cells)

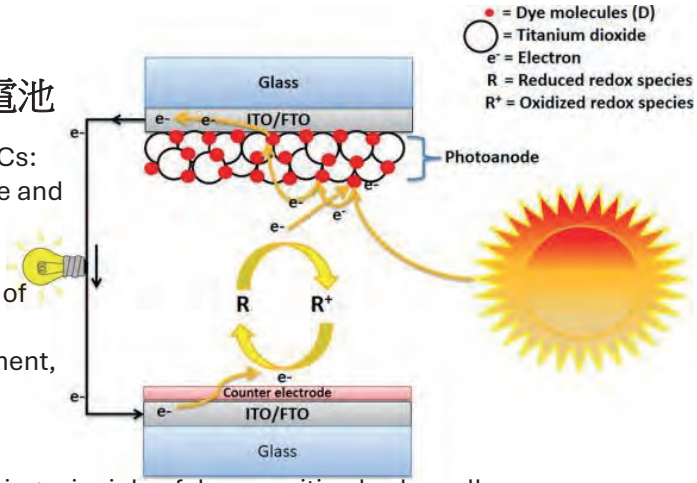
Silicon-based solar panels
Commonly used and commercially available. Good conversion efficiency.

Disadvantages: High cost and heavy.

色素増感太陽電池

Advantages of DSSCs: Inexpensive, flexible and good transparency.

With advancement of technology and materials development, the efficiency is increasing.

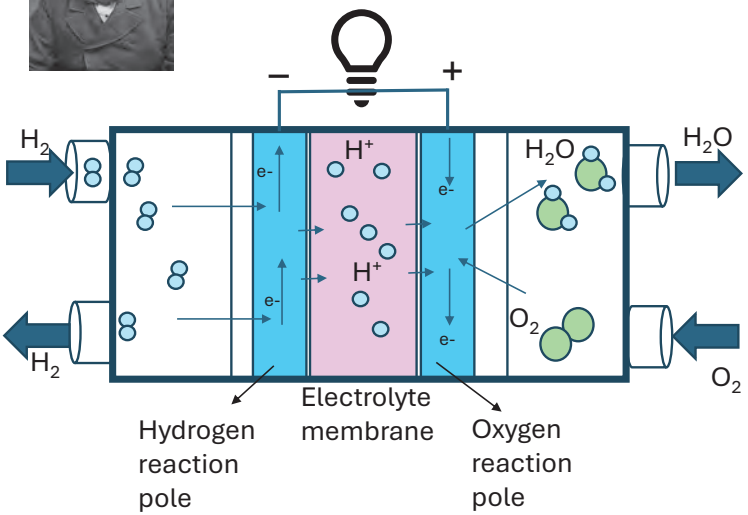


Working principle of dye-sensitized solar cell
Image Source: https://doi.org/10.1016/j.solener.2020.12.030

Michael Gratzel, the pioneer of molecular photovoltaic fabricating dye-sensitized solar cells. This photovoltaic system achieves the separation of light absorption from charge carrier transport. This process mimics the light reaction of natural photosynthesis (光合成).

(III) Development of new renewable energy

Fuel-cell technology.
Pioneered by William Grove in 1839.



Working principle of fuel-cell.

Development of more efficient electrolyte, membrane and electrodes.

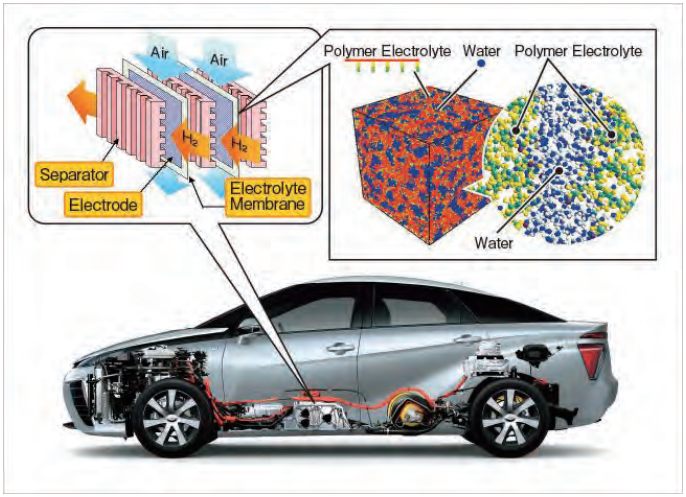
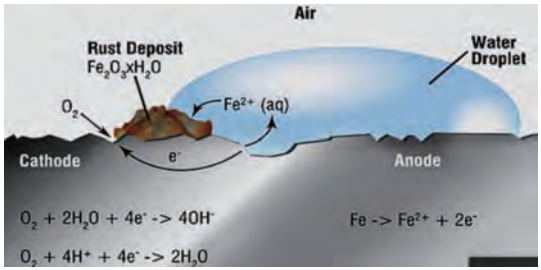


Image source:
https://www.tytlabs.com/technology/core/battery-fuelcell.html

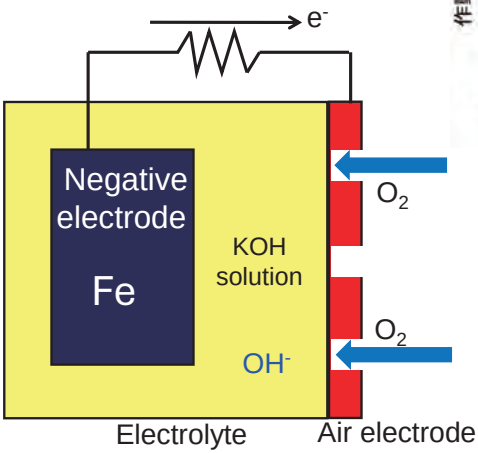
(III) Development of new renewable energy

- New source of electrochemical batteries such as metal-air batteries or metal-oxide batteries
- Example: iron (Fe) or Fe oxides

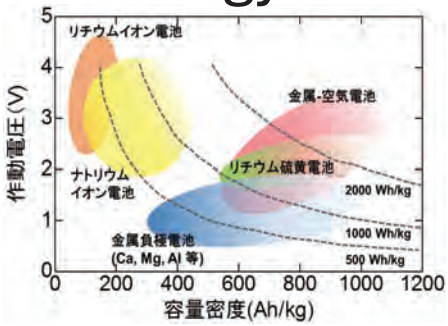
Rust (サビ) = iron oxide



Formation mechanism of rust (corrosion). Oxidation of iron forming iron oxides.



Through redox reaction of iron to form iron oxides and vice-versa, rechargeable Fe-air battery can be made.

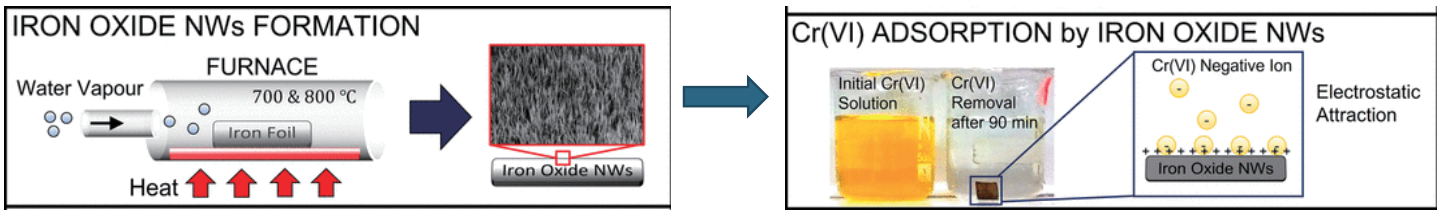


Quoted from 'NEDO Secondary Battery Development Road Map 2013'

- Fe is abundantly available in the crust of earth and oxygen from air is used in fuel.
- Cheap (low-cost)
- Safe (low volatility compared to Li metal)
- Simple iron-air batteries store up to 100 hours of energy at a tenth the cost of a lithium battery

(IV) Removal of harmful and hazardous materials

- There are also industrial waste that is very hazardous to the environment and living beings. Some materials are being banned from being released into the environment such as mercury (proper disposal is required).
- However, there are still hazardous chemicals being disposed of into the environment such as heavy metals which as very carcinogenic. Examples are hexavalent cadmium and chromium ions.
- Using nanomaterials, removal of these hazardous materials can be done.
- Example: removal of harmful hexavalent chromium ions nanomaterials.



Effective removal of harmful Cr(VI) ions by adsorption on iron oxide nanowires. Iron is abundance source and iron oxide nanostructures can be fabricated at a relatively low cost using various methods.

V. Reduced carbon footprint in construction

Source: https://www.archivibe.com/the-most-impressive-green-buildings-in-the-world/

When “Green building” is mentioned, is this how you imagine the buildings should be (green building)?

Does this kind of image come to mind when the term “green building” is mentioned?

Yes, this is one way to achieve CO_2 reduction. But there is also another way (material) to construct a “green building”.

The important question:

What is the main materials used in construction?

The answer is **concrete**.
Concrete is the 2nd most consumed material in the world (1st: H_2O).
Cement is the main material used to bind the raw materials (sand, rock, water) to make concrete.

Concrete and cement

Do you know that to produce cement, manufacturers grind clinker (the product of the calcination process) and mix it with gypsum (a calcium sulfate mineral) to prevent the powder from clumping and to control the subsequent reaction with water. In total, the process emits more than 800 kg of CO_2 for every metric ton of cement produced.

The demand for concrete is expected to increase.

~8% Portion of global anthropogenic CO_2 attributed to cement manufacturing	**~30 billion metric tons** Amount of concrete manufactured globally annually
1,450 °C Temperature of kilns used to process cement	**25–50%** Projected global increase in demand for concrete by 2050

Sources: International Energy Agency; Nat. Mater. 2017, DOI: 10.1038/nmat4930.

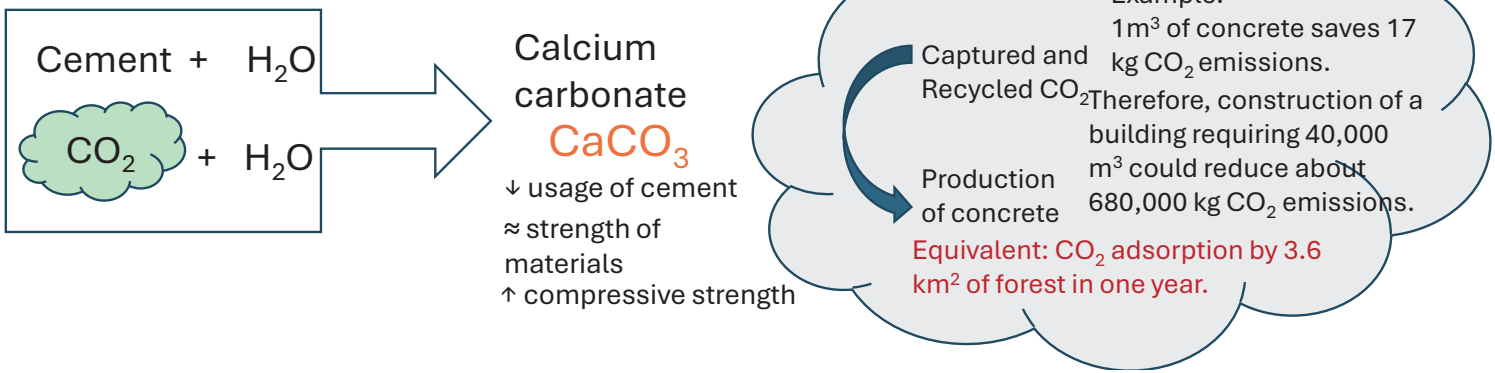
The question is, can concrete be made by incorporating waste products or do not emit CO_2 during manufacturing?

What is the main materials used in construction?

The answer is concrete.

It is the 2nd most consumed material in the world (1st: H_2O). And cement is the main material used to bind the raw materials (sand, rock, water) to make concrete.

Production of cement require a large amount of energy causing a large amount of CO_2 emission (Around 8% of total global CO_2 emission). A way to incorporate CO_2 into concrete can help to capture and reduce CO_2 amount.

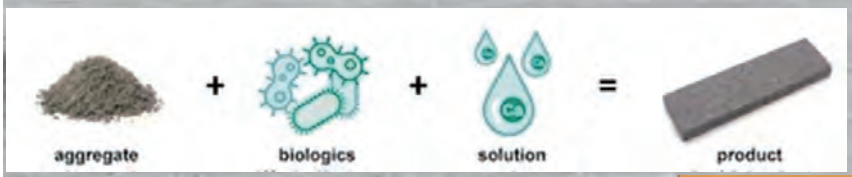


Let’s watch a video

- CO_2 infusion in new concrete technology (6 mins)
- https://youtu.be/DeKUlEOJ0p0

Biocement

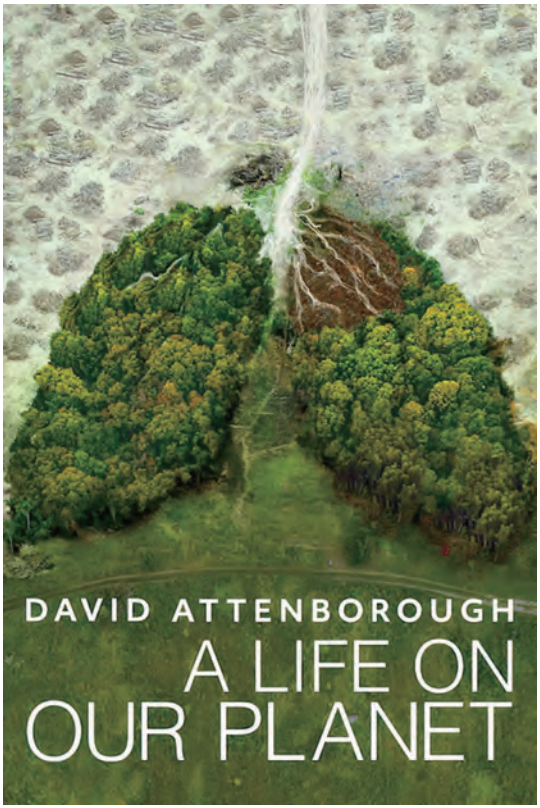
- Using biotechnology (natural microorganism) to create cement.
- Built with carbon and calcium, powered by biology.
- The same way as coral is made in nature.
- Let's watch one more video:
  https://www.youtube.com/watch?v=6BqoM4am8kwv
- https://www.youtube.com/watch?v=sXljX7Jio5A&t=4s



画像引用元：Biomason, Inc. 公式ホームページ

11 SUSTAINABLE CITIES AND COMMUNITIES

Reference in Japanese:
https://contech.jp/biomason/



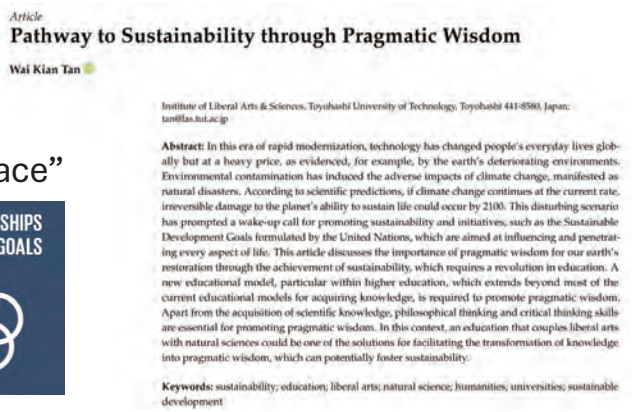
https://www.youtube.com/watch?v=64R2MYUt394

- 96 years old naturalist who has been to every continent on earth documented wild lives.
- This is his story and observation, “witness statement” over 60 years.
- Prediction on what would happen to us in 2100 if this does not change….

Awareness, Mindset and Wisdom

"Science without civilization, without wisdom, is a menace"

"文明も知恵もない科学は脅威になる"



Article

Pathway to Sustainability through Pragmatic Wisdom

Wai Kian Tan

Institute of Liberal Arts & Sciences, Toyohashi University of Technology, Toyohashi 441-8580, Japan; tan@las.tut.ac.jp

Abstract: In this era of rapid modernization, technology has changed people's everyday lives globally but at a heavy price, as evidenced, for example, by the earth's deteriorating environments. Environmental contamination has induced the adverse impacts of climate change, manifested as natural disasters. According to scientific predictions, if climate change continues at the current rate, irreversible damage to the planet's ability to sustain life could occur by 2100. This disturbing scenario has prompted a wake-up call for promoting sustainability and initiatives, such as the Sustainable Development Goals formulated by the United Nations, which are aimed at influencing and penetrating every aspect of life. This article discusses the importance of pragmatic wisdom for our earth's restoration through the achievement of sustainability, which requires a revolution in education. A new educational model, particular within higher education, which extends beyond most of the current educational models for acquiring knowledge, is required to promote pragmatic wisdom. Apart from the acquisition of scientific knowledge, philosophical thinking and critical thinking skills are essential for promoting pragmatic wisdom. In this context, an education that couples liberal arts with natural sciences could be one of the solutions for facilitating the transformation of knowledge into pragmatic wisdom, which can potentially foster sustainability.

Keywords: sustainability; education; liberal arts; natural science; humanities; universities; sustainable development

Source: https://doi.org/10.3390/philosophies7060131

Awareness, Mindset and Wisdom

Source: https://www.youtube.com/watch?v=H5l9RHeATl0

PPAP

Public Private Action for Partnership (PPAP)
OR
Pen-Pineapple-Apple-Pen?

Recent status and actions toward SDGs

Source: https://www.city.toyohashi.lg.jp/15137.htm

ENVIRONMENT

The Japanese way of recycling waste

Firms seek to harness comprehensive trash-sorting system for chemical production

by **Katsumori Matsuoka, special to C&EN**

July 22, 2024 | A version of this story appeared in **Volume 102, Issue 22**

Credit: Shutterstock

Trash sorting and recycling are practiced rigorously in Japan.

Garbage sorting is a well established ritual in Japan that few question, despite the time and effort involved. A typical resident of a major city has Mondays and Thursdays as options to take combustible garbage to a designated collection site. Tuesdays are for metal cans and polyester bottles, Wednesdays for newsprint and other recyclable paper, and Saturdays for other plastic containers. On Sundays, all trash stays home.

Japanese citizens are generally accepting of these rigid trash-sorting guidelines. Their willing participation has inspired planners to think about innovative ways to mine this waste. As early as 2003, Japan was converting used plastics into ammonia. Now, despite **setbacks in the US** and elsewhere, more and more Japanese companies are aiming to use household waste to produce basic chemicals like hydrogen, ethanol, and ethylene.

> **"Our process uses microorganisms that exist in the stomachs of rabbits."**
>
> — ***Satoshi Koma,*** *head of corporate new business development in the biorefinery group, Sekisui Chemical*

Source: https://cen.acs.org/environment/Japanese-way-recycling-waste/102/i22

- Use renewable energy to reduce carbon emissions: solar panels, fuel-cells, wind energy etc
- https://www.youtube.com/watch?v=XPKGLJaZyXg

Reduce food waste and loss

- In Japan, approximately 6.5 million tons of food that is still edible are disposed as leftovers or past expiration date.
- More than half, 3.5 million tons, is from the business sectors.
- About 2.9 million tons come from households. Mostly are leftovers such as spoiled food or edible peels.
- Applications such as Reduce Go, TABETE and FOODPASSPORT, connect restaurants and cafes that do not waste food.
- You may refer to the link below for more actions: https://www.gov-online.go.jp/useful/article/201303/4.html

Have you ever opened your refrigerator and felt a surge of anxiety?

The simple Japanese method for a tidier and less wasteful fridge

12 hours ago

By Rachel Nuwer, @RachelNuwer.

Share

Rachel Nuwer

There are simple organisational methods for reducing fridge waste (Credit: Rachel Nuwer)

Source: https://www.bbc.com/future/article/20240715-the-simple-japanese-method-for-a-tidier-and-less-wasteful-fridge

Recognition and awareness promotion

- **JAPAN SDGs Award**: to promote outstanding efforts, either domestically or internationally for SGDs achievement.
- **JAPAN SDGs Association:** private organization that aims to promote efforts to achieve the "SDGs (Sustainable Development Goals)" by raising awareness of the goals and supporting various activities by companies, organizations, and individuals. https://japansdgs.net/

Examples:

- Uomachi Shopping Street Association
- Osaka Prefectural Government
- Kyushu Rikisaku Community
- TABLE FOR TWO International
- Fuji Optical Co., Ltd.

Source: https://www.mofa.go.jp/policy/oda/sdgs/award/index.html

'Fukuoka Method'
Underground rainwater harvesting tank "Tametotto" in collaboration with Fukuoka-based constructor Daiken.

"It was an eye-opener and I now understand better how each of us have a role to play towards the achievement SDGs, said an editor of a local newspaper in Japan"

"This story was well understood and appreciated by a wide Japanese audience who knows SDGs only too well in theory but find it difficult to practice in everyday life."

Source: https://unhabitat.org/news/27-jan-2021/contributing-to-sdgs-through-japanese-low-cost-and-sustainable-environmental

Organizations for Promoting Sustainability in Japan

- Sustainability Forum Japan
  Link: https://www.sustainability-fj.org/
- Sustainable Brands Japan
  Link: https://www.sustainablebrands.jp/

These organizations are promoting information disclosure and sustainability for people and businesses.

Expansion of efforts internationally

- Awareness raising in international stage
  - Tokyo Olympic / Paralympic
  - 2025 World Exposition (https://www.expo2025.or.jp/en/overview/)
  - Partnership with international regions through **Public Private Action for Partnership (PPAP)**.
  - Examples are available in the link below:

  https://www.youtube.com/watch?v=u8OLKh66Wmg

Goals of Expo 2025 Osaka Kansai

- ☑ To contribute to the achievement of the Sustainable Development Goals (SDGs)
- ☑ Achievement of Japan's national strategy Society 5.0

EXPO for SDGs

In 2025, the world will be a mere five years away from 2030,
the year the United Nations has set as the target for achieving the Sustainable Development Goals (SDGs),
making it a crucial one for ramping up efforts to achieve these goals.
Therefore, Expo 2025 Osaka, Kansai will become a key platform for reaching the SDGs by 2030.

The key is "Society 5.0"

"Society 5.0" is Japan's national strategy to develop a human-centered society that progresses economically and resolves social issues through a system that combines both cyber and physical spaces in a sophisticated manner. It refers to a new form of society chronologically following hunting, farming, industry, and information societies.

A society that is able to resolve a variety of issues on a global scale with technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), robotics, big data, and biotechnology is a society that will have achieved the SDGs.

Conclusions

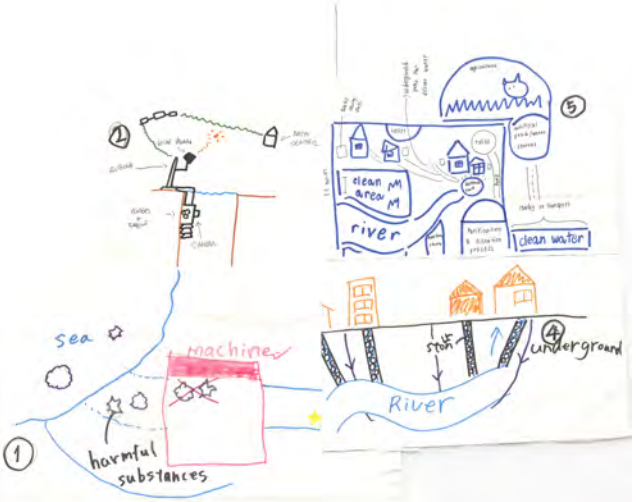
- Understanding of natural science and materials science can help in tackling the climate issue toward achieving a sustainable future.
- Awareness of natural science and materials science is important in preserving our environment and creating much needed new sources of energy.
- **Most importantly, no matter how small an effort is, everyone can contribute toward SDGs**.

Group work discussion

1. Work together in your groups to develop an initiative that you, as high school students, can undertake to contribute to the Sustainable Development Goal assigned to you.
2. Draw on your experiences and knowledge from your background to address the issue.
3. Consider the pros and cons of your idea.
4. How does it impact other lifeforms?

Presentations

6 CLEAN WATER AND SANITATION



CLEAN WATER

SANITATION

A1 SDGs6

Our group discussed Goal 6: CLEAN WATER AND SANITATION. Currently, 2.2 billion people in the world lack access to safely managed drinking water, and 3.5 billion people lack access to safely managed sanitation. The purpose of this goal is to ensure the availability and sustainable management of water and sanitation for all. We considered solutions to this goal from three perspectives. First, regarding education, we aim to raise awareness about water issues by issuing warnings through social media and posters. Additionally, in schools, we will create committees and hold competitions to promote water conservation. For sanitation, we will educate people in developing countries about the responsible disposal of sanitary products. For example, after using toilets, it is important to flush. Furthermore, sanitary pads should only be disposed of in designated sanitary boxes. However, as high school students, it is challenging for us to travel to developing countries, so we will teach people through online classes and by sending posters. Second, regarding fundraising, we recognize that nothing can be accomplished without financial support. Therefore, it is essential to create fundraising organizations and donate money to associations that address clean water and sanitation issues. The funds raised would significantly improve facilities such as restrooms. Additionally, we believe it is necessary to request government support for the costs associated with water purification models. With sufficient funding, we can also develop our ideal sanitation environment. Finally, regarding the distribution of supplies, sending toilet paper, soap, sanitary napkins, medicines, and other hygiene products to developing countries can greatly improve their quality of life. Soap helps people maintain hand hygiene, while clean sanitary products ensure bodily hygiene. Medicines can protect individuals from diseases, and sending water purification bottles can also be beneficial, as they can purify various types of water using filters. In conclusion, we discussed how to approach the issues related to Goal 6, believing that education, funding, and distribution are the three most important actions we can take

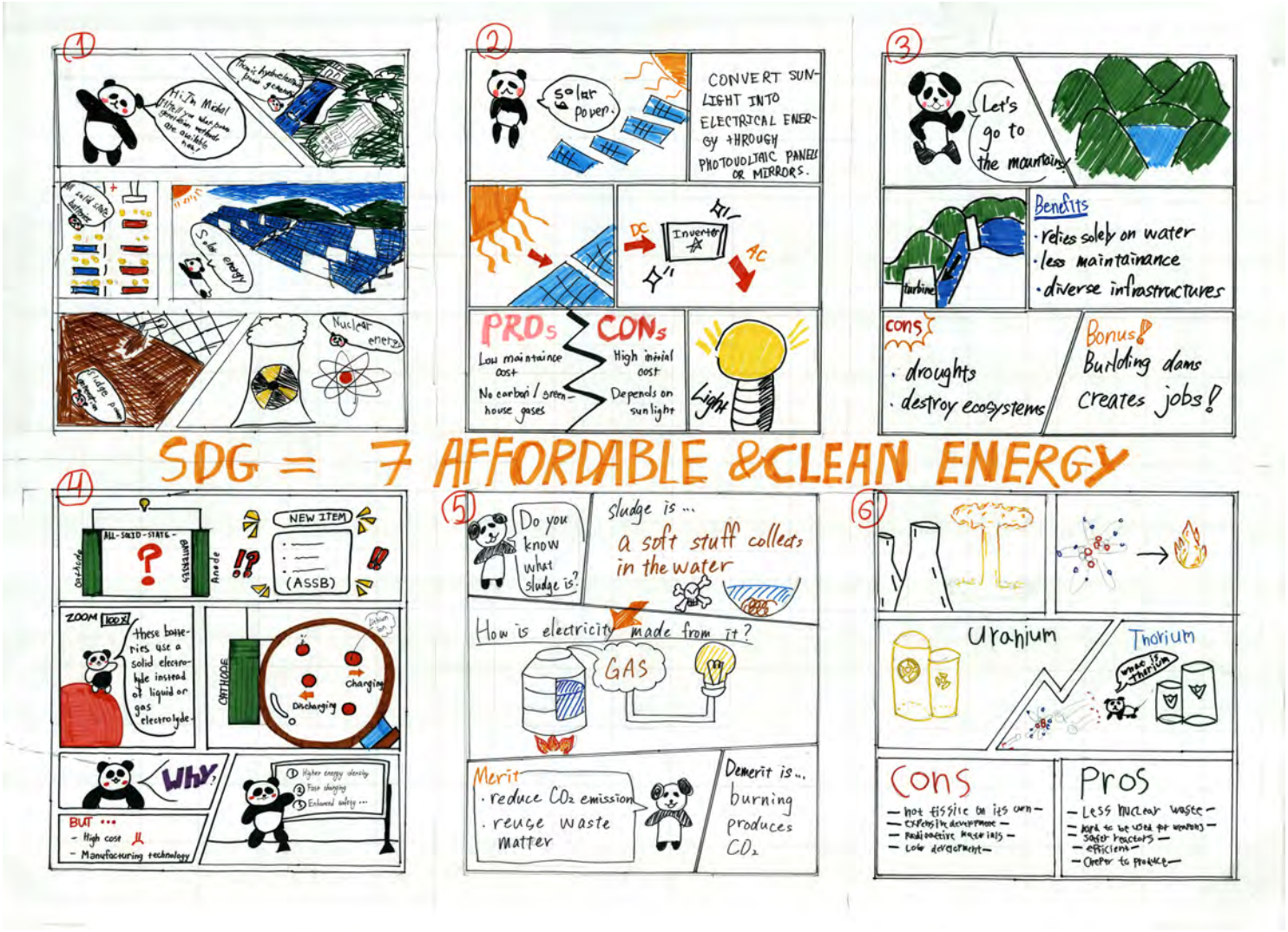

6 CLEAN WATER AND SANITATION
How do we provide clean water and Sanitation to everybody in the world
Solutions
5%
43%
Monitoring STATION
CLEAR Ning CENTER
filtration
Stone
Recy cling CENTER
river
Agriculture
HOW TO
awareness
social media
posters, Call blog
debates
Fundraising
Donating money
WINNER
RULES
Sending sanitary staff
Make rules in side the house

A2 SDGs6

Our group discussed about Goal6 CLEAN WATER AND SANITATION.

In the world,only 56 percentage of population are using safely managed sanitation services. And 24 percentage of population are using basic sanitation services.The others can't use enough sanitation services.It is a big problem.We have to solve it .Our team found some solutions so I'll show you. First,we can donate some money to provide sanitation services but if we want to collect much money,we have to ask many people to help us.So we should use SNS to share this problem.Many people use SNSso we might be able to gather many money and good ideas.If we can collect much money and governments help us,we can build some facilities to clean water and sanitation. First facilities are stations to collect information about water.If we install devices in rivers,they will send information about rivers to those stations. Second facilities are water filtration planets. Third facilities are desalination of sea water plants.If there are these facilities,we can use safety water without rivers. And Fourth sewage plants. Of course, reducing waste of water is important too. We can recycle water to wash our cars or to use agriculture. Anyway we can solve this big problem.

7 AFFORDABLE AND CLEAN ENERGY



B1 SDGs7

Participating in the High School International Conference was an incredible experience that allowed me to explore and discuss global issues related to the SDGs (Sustainable Development Goals). The conference's main theme was sustainability, and it provided a platform for students from various countries to engage in thoughtful discussions and collaborative learning.

The event began with a lecture from a professor on what we, as high school students, can do to contribute to the SDGs and sustainability. The professor's insights helped set the stage for our discussions. We were divided into different groups based on our interests, with science-based groups focusing on technical solutions, and arts groups exploring ideas from humanities and social sciences perspectives.

I was part of the science group, where we discussed SDG 7: Affordable and Clean Energy. Our discussions focused on the development of new renewable energy sources. We shared knowledge, asked questions, and aligned our understanding of various concepts. Each member then chose a specific topic to research further. I focused on solid-state batteries, a technology that companies like Toyota are exploring for use in vehicles. I researched their mechanisms, advantages, and challenges. Other members researched different energy solutions, and we all presented our findings.

Through our discussions, we realized that while each energy solution could address certain issues, they also had limitations or could lead to new challenges. We concluded that a combination of different energy sources, leveraging their strengths and mitigating their weaknesses, might be the best approach. We also recognized the need for continued technological development.

This conference highlighted the importance of understanding diverse perspectives and the need for young people to take initiative in shaping a sustainable future. It was a valuable experience that showed me the importance of thinking globally and acting collaboratively. I am grateful to my fellow participants, the university student TAs, and the professors for making this journey both educational and enjoyable.

7 AFFORDABLE AND CLEAN ENERGY

Renewable Energies

Solar Energy

Convert sunlight into electrical energy

- Low maintenance cost
- No carbon emissions
- No greenhouse gases

! CONS !

High Initial Costs

Depends on Sunlight

Deforestation

Hydroelectricity:

! CONS!

Droughts

Ecosystems

- Diverse infrastructures
- Relies solely on water
- Less maintenance
- Have more than one use
- Can complement other sources of energies

BONUS!
Building dams create jobs

Atomic Energy

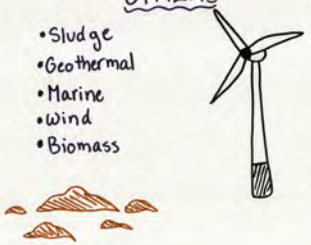
→ Nuclear Waste

☆ Thorium

- Less Nuclear waste (Lower risks)
- Abundance
- Efficiency

OTHERS

- Sludge
- Geothermal
- Marine
- Wind
- Biomass



How Would You Share it?

BY COMIC ON SOCIAL MEDIA

1. Our Idea

Create learning online comics to achieve SDGs 7

2. The Benefits

- easy to understand, translate, and share
- More interesting! - Children can read

3. How can we make it?

- create interesting comics to explain the problem and solutions
- make a quiz in the end of each chapter
- post the comics on our main account on social media apps

4. Our aims

- raise awareness of the problem
- spread the message to many people of many ages

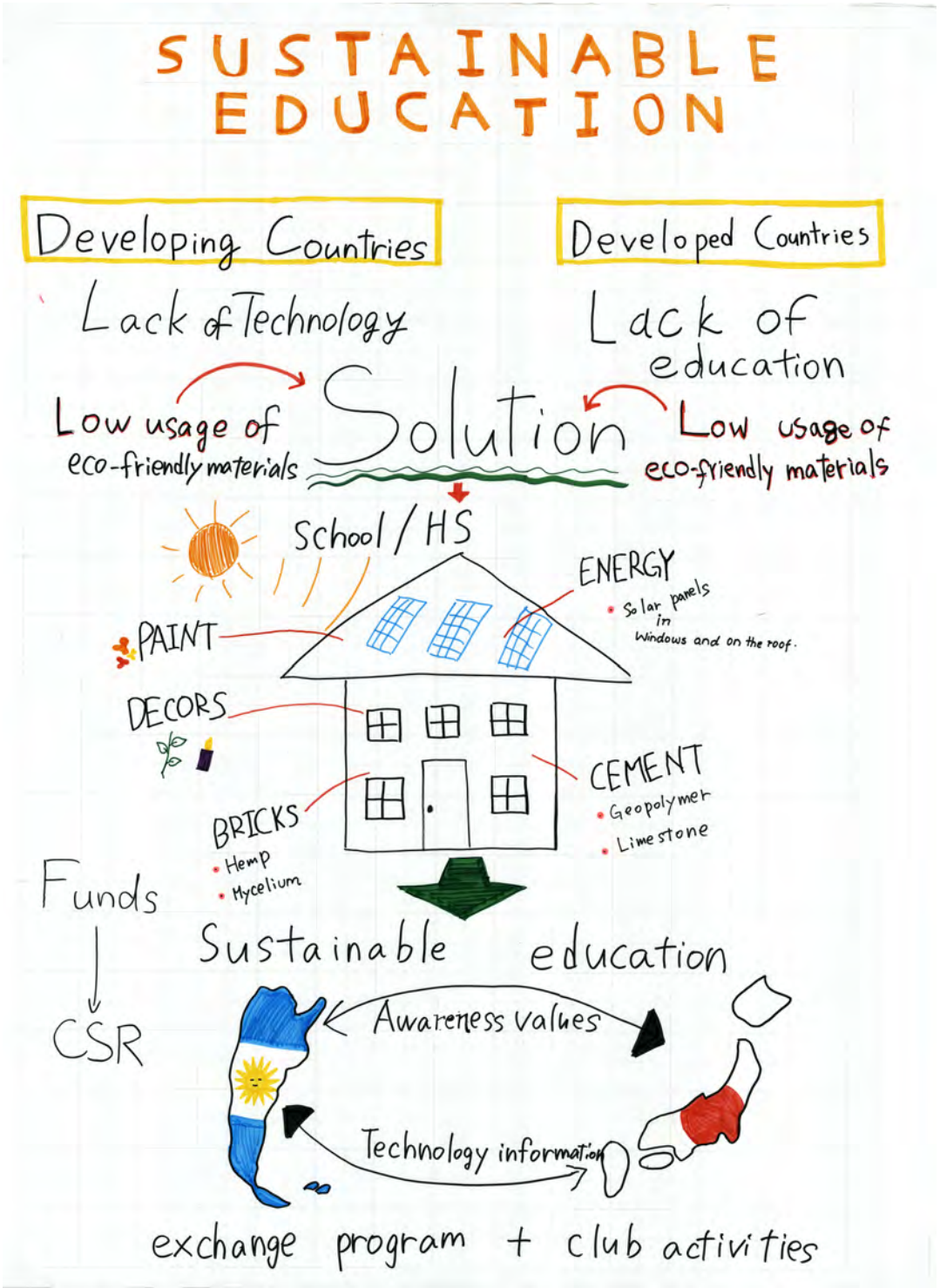
B2 SDGs7

This time, we discussed clean energy with international students from different countries and deepened our understanding of the issues facing modern society.

First, we were divided into the humanities and sciences the day before the discussion, and on the day of the discussion, both groups came together to present a shared solution. Our group came up with the idea of using cartoons to raise awareness about clean energy generation. I believe we were able to deepen our discussion on the various issues leading to this solution, transcending national and generational boundaries.

It was a very meaningful experience.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



C1 SDGs9

I was very much looking forward to this year's international conference. The reason is that I can meet Nin, who I became friends with at an international conference last year. When I met her on the day, I felt relieved. Also, I was nervous when I saw high school students from all over the world. The keynote speech was a very informative story that struck us today. After that, they were divided into groups and had a discussion. The theme of my team was No.9 Industry Innovation and Infrastructure. Since there were many things that we didn't really understand about our theme, we first discussed SDG's, which everyone in the group was interested in. Next, we researched and presented our themes on our own. We decided to make a poster based on the idea we thought was good.We made posters about sustainable house They have 5 points. The first is Paint, the second is Energy, the third is Cement, the fourth is the Bricks, and the fifth is Decors. We wrote down the details about it and showed it to the art group the next day.They showed interest in our posters. On the other hand, it was interesting that the posters of the art group were supposed to have the same theme, but the content was completely different. However, when the two groups merged together, the conversation did not progress and was in trouble. Furthermore, I was very impatient because there was an announcement that day.Thanks to our TA, we managed to settle the story, and I was relieved that we were able to make a poster safely. However, although the content of the presentation was difficult and difficult for me, the question-and-answer session was managed by my friends. Our TA were very kind, and I was able to participate very much because they spoke slowly when there was something I didn't understand.In the future, I would like to improve my English and challenge the meeting again. Thank you very much.

C2

Promoting sustainable technology through education

- Geopolymer
- Limestone

Bricks
- Hemp
- Mycelum

Decors
- Candles
- Planters

sustainable house

EXCHANGE KNOWLEDGE

Education in sustainable house

convey a technology to children

- Using VR

→ Whenever and Wherever they can learn

Basically, **EDUCATION** is the most of important approach

- make school and give opportunity to learn technology, public policy and development research
  - ↳ Donate some stuff we don't use any more.
- **Exchange programs** &

Make a class for learning Third countries

Developed countries...

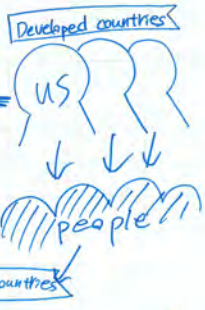
↑ Awareness to take action

Developing countries...

- ethical consumerism
- CSR
- local technology

↓ Cost

Conclusion

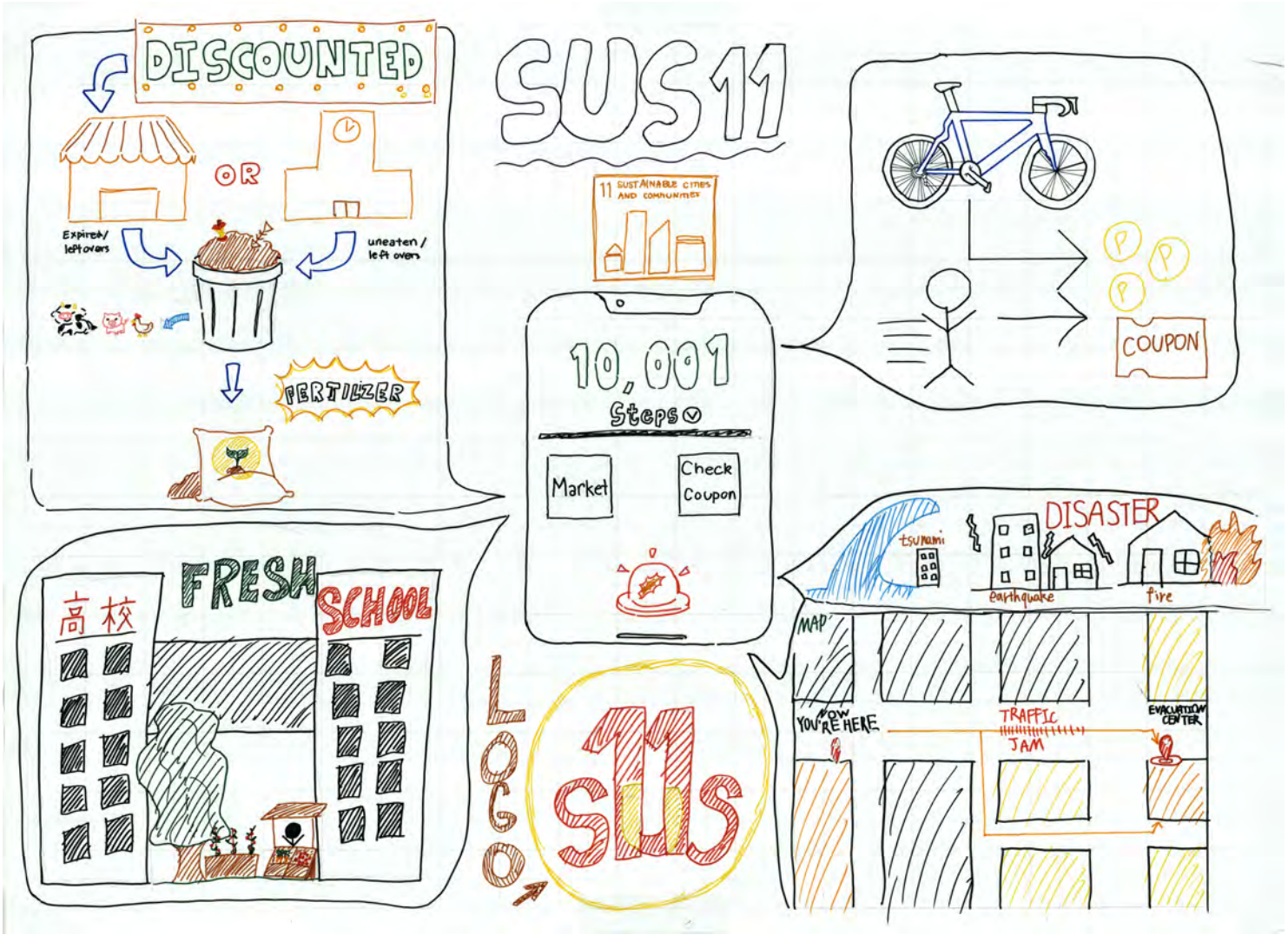


Sustainable world for everyone

C2 SDGs9

Our team's SDG was Goal Number 9," INDUSTRY, INNOVATION, AND INFRASTRUCTURE." We focused on two relevant targets: "technology for everyone" and "sustainability by innovation." We concluded that education will be the key to accomplishing each target, even though it works differently. For example, technology transfer is one approach for developing infrastructure in 3rd world countries. Yet this cannot serve as a fundamental solution to the present situation since it is difficult for not well-educated people to maintain those technologies. About innovation, we have thought of one specific technology idea, "sustainable house." Yet, it all comes from academic knowledge. To have people use those innovations, we need to increase people's awareness to take action.

Those can also come true through education. But how can high school students achieve those?? One idea is that we, students of developed countries, go to 3rd world countries in the "two-way" exchange program and share the experience with organizations with greater power. Eventually, we will accomplish our two goals. Let's make a sustainable world for everyone together.


DISCOUNTED
OR
Expired/ leftovers
uneaten / left overs
FERTILIZER
SUS11
11 SUSTAINABLE CITIES AND COMMUNITIES
10,001 Steps
Market
Check Coupon
COUPON
DISASTER
tsunami
earthquake
fire
MAP
NOW YOU'RE HERE
TRAFFIC JAM
EVACUATION CENTER
FRESH SCHOOL
高校
LOGO
SUS

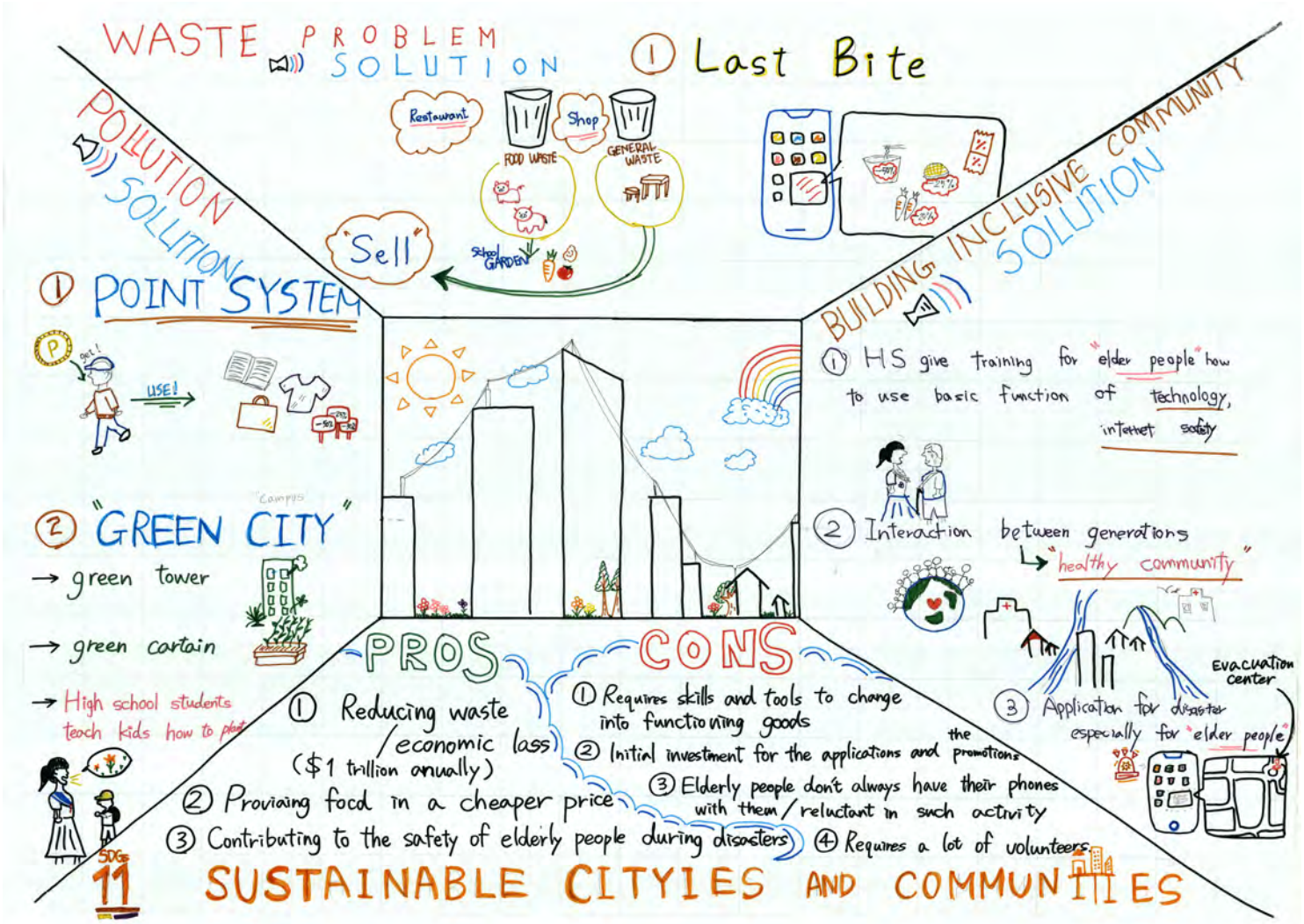
D1 SDGs11

The poster presentation consisted of four parts: using a smartphone app to prevent disasters and encourage people to bike and walk, collaborating with stores to use composters and obtain fertilizer, farming with the fertilizer obtained here, and maintaining services with income from the sale of vegetables and fruits. The first part , the application involves displaying a map in the event of a disaster, such as a tsunami or earthquake. By displaying the current location, evacuation routes, and evacuation sites, the application allows for efficient evacuation, and high school students can also help by guiding the elderly and other people in need. In addition, as a daily function, points and coupons are accumulated according to the distance of walking and cycling, and can be used for shopping on the Internet shown after this.

The next content will be recycling of waste products, food waste, and waste oil from restaurants and stores, respectively. From the waste products, the company will make practical products such as furniture from them and sell them to make a profit. The nutritious parts of food scraps are dried and fed to livestock, and the wet parts are mixed with soil and used as fertilizer in the composter to grow vegetables in the vacant space of the school. This will be sold online, as mentioned above, to people all over the country and to neighbors at direct sales. The vegetables produced here will also be made into pickles and stored for a long time for use in restaurants, helping to improve the skills of high school students and reduce food loss. Waste oil can be used to move these items with less environmental impact than new fuel. In addition to this idea,

fruit trees could be grown in the vacant space at the school, and the fruits grown there could be sold in the same way.

During the presentation of this poster, a question was raised as to whether it would be difficult for high school students to safely handle a digital map application such as this one. However, it was concluded that it may not be technically impossible to solve this problem by relying on external services such as Google Maps.


WASTE PROBLEM SOLUTION
Restaurant
Shop
FOOD WASTE
GENERAL WASTE
Sell
School GARDEN
① Last Bite
POLLUTION SOLUTION
① POINT SYSTEM
USE!
② "GREEN CITY"
→ green tower
→ green curtain
→ High school students teach kids how to plant
BUILDING INCLUSIVE COMMUNITY SOLUTION
① HS give training for "elder people" how to use basic function of technology, internet safety
② Interaction between generations
"healthy community"
③ Application for disaster especially for "elder people"
Evacuation center
PROS
① Reducing waste / economic lass ($1 trillion annually)
② Proviaing food in a cheaper price
③ Contributing to the safety of elderly people during disasters
CONS
① Requires skills and tools to change into functioning goods
② Initial investment for the applications and the promotions
③ Elderly people don't always have their phones with them / reluctant in such activity
④ Requires a lot of volunteers
SDGs 11
SUSTAINABLE CITYIES AND COMMUNITIES

D2 SDGs11

Our group focused on SDGs Number 11, SUSTAINABLE CITIZENS AND COMMUNITIES. During our discussions, we thought of solutions to three problems connected to this SDGs. These three problems are air pollution, waste and how to build an inclusive community.

First, we came up with some solutions to solve the air pollution problem. Our first idea is to use a point system to encourage people to create less pollution.

For example, if you walk to school, you get points that can be used for discounts at stores. Our second idea is to educate others in making a 'Green City' where has green towers and green curtains .For example, high school students could teach younger students how to plant Second, we came up with a solution to solve the waste problem. Our idea is to encourage others to use the "Last Bite " app. Let me explain a little about this app. This app connects stores and consumers with the goal of reducing waste. For example, food waste is turned into fertilizer and used to grow vegetables in school gardens. General waste is upcycled so that it can be of use to others and not just thrown away. Also, products are discounted and sold at a lower price. The third problem we looked at is how to build an inclusive community. We thought a sustainable city should have more interaction between different generations. We, thought of two ways to make that happen. The first one is to develop a volunteer program where high school students could give training to elderly people on how to use basic functions of different technology and internet safety. The second one is to develop an application that is designed to help community members, especially elderly people, find a nearby evacuation center in a disaster. In conclusion,we thought it is necessary to people's cooperation and applications to realize sustainable cities and communities.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS

Problem : Over consumption
Production

Quantity > Quality

PROBLEMS

People want
New Trends

Multiple waste

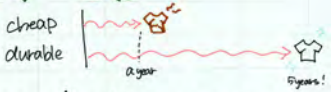
E-waste plastic clothes

Solution Human awareness

- APP: "WE: COMPANY SIMULATOR"
  - → Starts as a click-based company simulator
  - → Becomes a choice-based game
  - → Win points and earn rewards
- Fun way to learn!?

Solution : 3R

1. Reduce



Longer life span, More durable materials

2. Reuse

Second hand products

3. Recycle

Smart bin , Recyclable materials

E1 SDGs12

Our team discussed the goal Number 12, "RESPONSIBLE COMSUMPTION AND PRODUCTION". We were thinking about problems first and we concluded that there are 3 problems: that people want quantity over quality, that People want to follow the trends and multiple wastes like plastic, clothes and E-waste. To deal with these problems we suggest 2 solutions. The first solution is to change people's awareness. We came up with a simple game to help consumers and producers learn good consumption practices. It allows you to experience both the operator and consumer side of the company, tapping on the options to consume and produce more and more. Then, if you consume or produce in an environmentally friendly way, you earn the title of good consumer or producer, and if you consume or produce in an environmentally bad way, you earn the title of over-consumer or over-producer. This is based on a points system, so if the company makes money but is not ethical, it loses points. You are rewarded with points earned in this game. Changing people's awareness makes it easier to carry out the second solution. The second solution is actions based on the 3R principles. We proposed buying products made by more durable materials to accomplish 'reduce'. Buying sturdier clothes, even if they cost a little more than buying cheaper clothes every year, can save you money while helping to 'reduce' in the long run! To achieve 'reuse', we suggested that people use an app they can sell things they don't use anymore, and someone can buy that: a second-hand app. It connects to also reduce new products and waste. We believe that government cooperation is absolutely essential to promote 'recycle' because it costs heaps. But it is the easiest and most efficient way for people to contribute recycling to put some smart bins that you can get rewards when you throw away plastic bottles into those bins. In addition, it is important for companies to use recyclable materials when they produce anything. This reduces the use of new resources and is environmentally friendly.
At last, to achieve this goal, it definitely needs everyone's cooperation including consumers, government and companies. Let's all change our attitudes to consumption.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

1

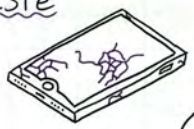
- People want new things
- Quantity over quality
- Follow the trends

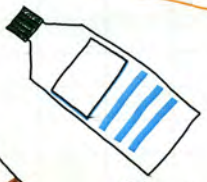
CAUSES

OVER PRODUCTION

EXAMPLE

E-waste





Plastic waste

Low quality

Cheap product

2

REDUCE

3R

REUSE RECYCLE

SOLUTIONS

WASTE OR WEALTH

① Raise awareness
② Educate young generation
③ Take actions

	PROS	CONS
① POSTER	· Easy to attract attention	Use too much paper
② QUIZ	· Happy learning	Take time
③ RECYCLE BINS	· Feel accomplished	Expensive to install

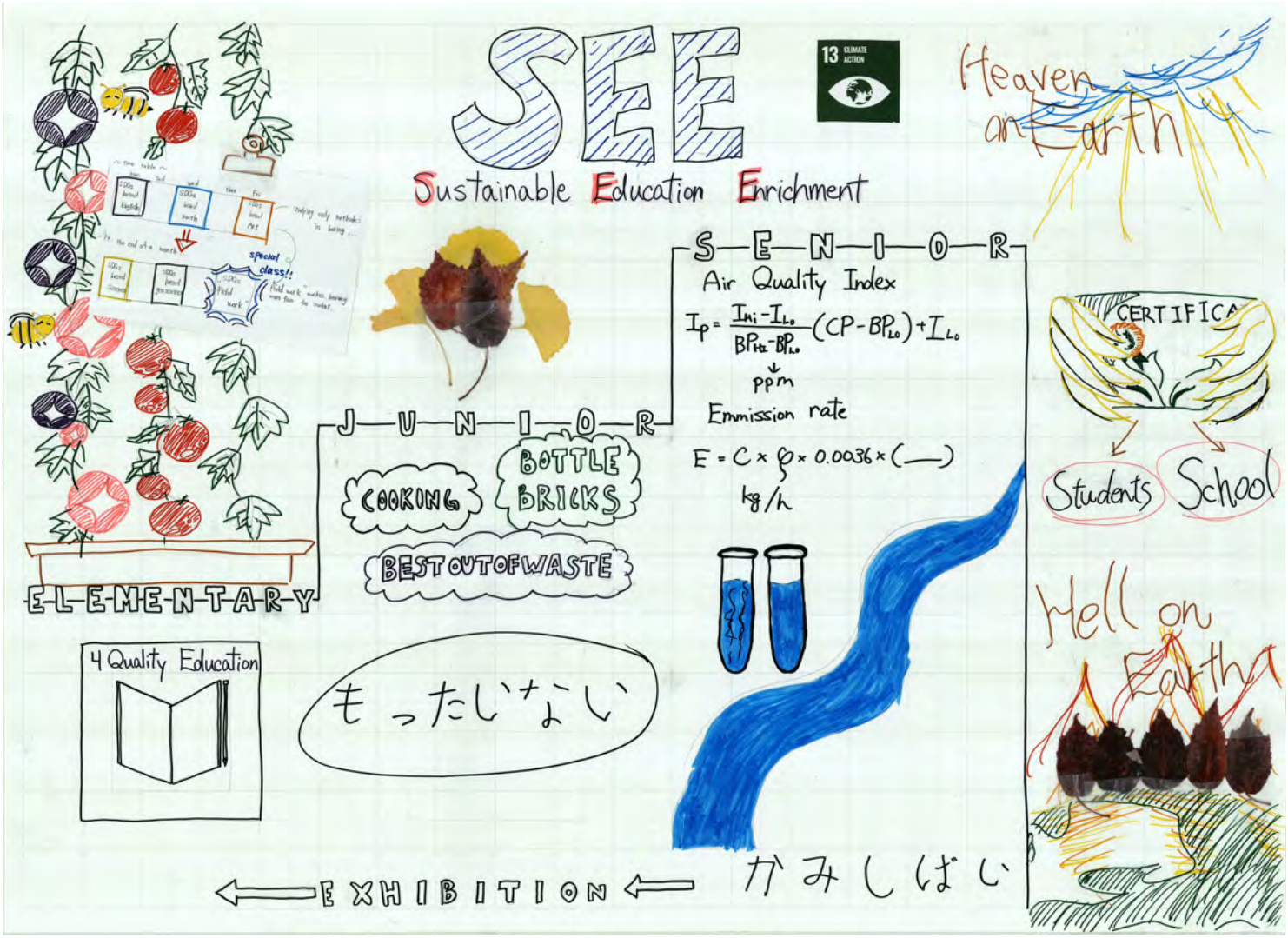
E2 SDGs12

In my group, we discussed "responsible consumption and production."

To think about that, we came up with some problems, such as food waste, energy consumption, overproduction, and so on. We tried to make a solution focusing on "overproduction" because overproduction requires a lot of resources, which has bad effects on the environment. We thought there are three reasons causing this problem: people wanting new things, prioritizing quantity over quality, and following trends. An example is the "iPhone." New iPhones are released every year, even though there are only a few differences. But people tend to buy them just because they are new products. We thought this might lead to "overproduction." Also, we think that this problem increases waste. As an instance, we identified several types of waste. There are many types of waste, like e-waste, plastic waste, and low-quality, cheap products. E-waste comes from electrical appliances, like smartphones. Smartphones have short lifespans, which makes it easier for us to dispose of them. An example of plastic waste is plastic bottles and plastic packaging. How about low-quality, cheap products? This relates to the reason why overconsumption occurs. Low-quality products are easy to break, and cheap products are easy to buy. Many people prefer quantity over quality, and plastic products are often the answer to their choice. We have to solve these waste problems. To do this, we focused on the 3Rs: reuse, reduce, and recycle. Speaking of recycling, most parts of smartphones can be recycled. On the other hand, using alternative materials can reduce the amount of plastic. For reusing, we can promote the use of secondhand products, such as used cars and used clothes. This idea is easy to think of, but to practice it, we need to change our mindset. To change people's minds, we suggest the campaign "Waste or Wealth." This campaign aims to educate people about what waste is and what wealth truly means. It consists of three main elements: Raise awareness, Educate the younger generation and Take action. We also talked about a specific solution that we can implement in our school. This is because young people today will have a big impact on society in the future. First, we suggest creating posters. By visualizing the problem, people can understand it more easily. It would be even better to include images of eco-friendly and non-eco-friendly worlds, like the poster we presented. Second, we recommend holding quizzes in classrooms. Because quizzes are fun and engaging, they can be an effective way to teach people about the seriousness of the problem. Third, we propose installing recycling bins. Without practical methods to address the problem, people might forget what they should do. To prevent that, we should provide ways for everyone to contribute to protecting the environment. Following these methods can also give people a sense of accomplishment.

With these solutions, we believe we can address the issue of "overproduction."

13 CLIMATE ACTION



F1 SDGs13

We came up with the SEE program as a way to achieve the 14th goal of SDGs, climate action. SEE is in short for Sustainable Education Enrichment. First, elementary school students learn about environmental issues and, after that, take simple actions, such as growing green curtains. The students can step up to the next stage if they graduate the previous stage.

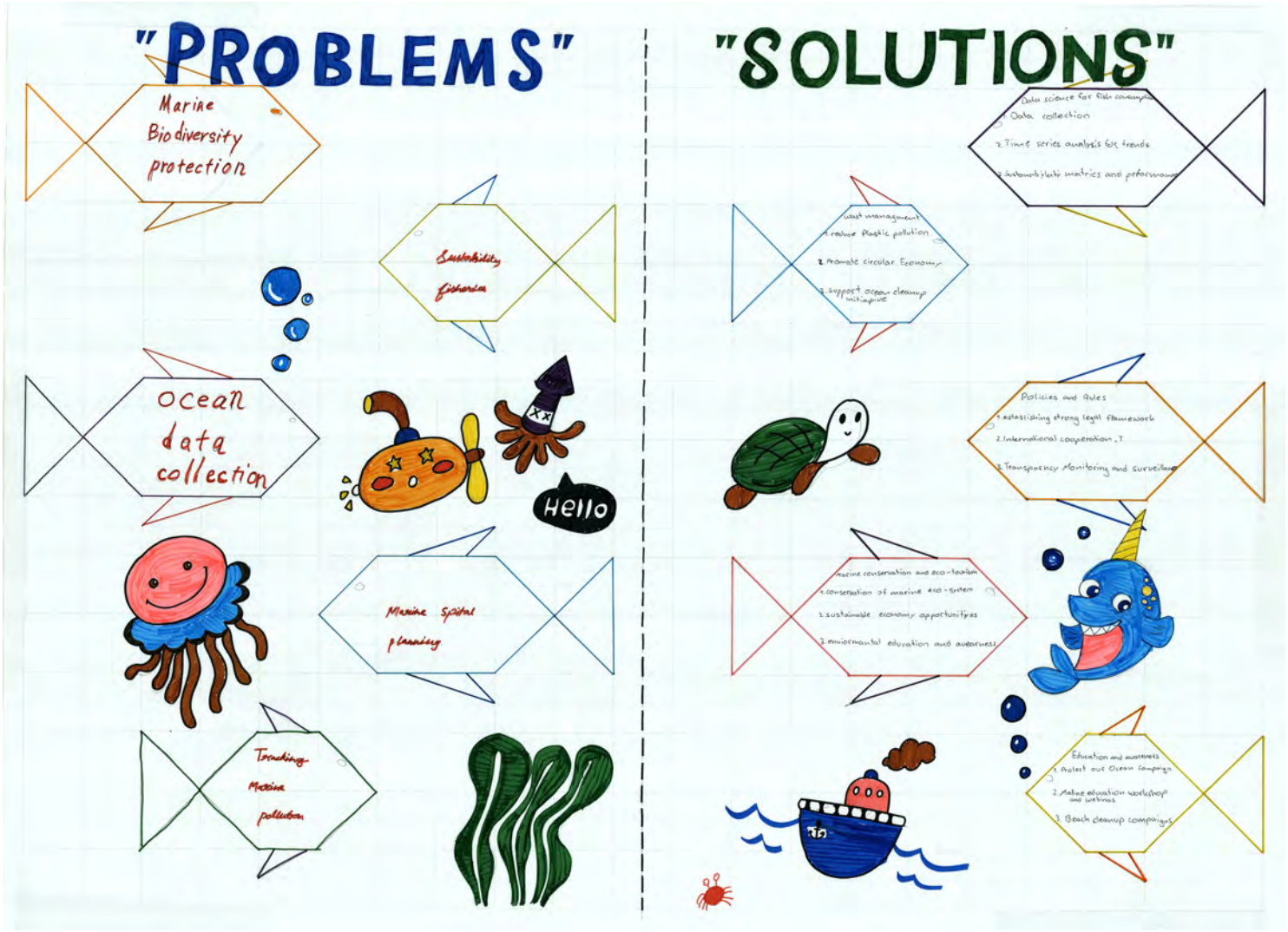
In junior high class, students try to cook considering "もったいない", and in senior class, students measure the p.h. of the rivers to make their understanding of these issues deeper.

It is also important to tell what we have learned to the next generation, for example, by かみしばい. After having completed all of the SEE programs, the students and schools will receive a certificate, which is the unique point of this idea. After completing the SEE programs, if you take some action for the environment, you will be in heaven on Earth, and if not, you will be in hell on Earth. These were our final ideas how to achieve this goal by education.

13 CLIMATE ACTION

F2 SDGs13

In my team, we were thinking about the number 13 on the SDGs (Sustainable Development Goals) climate action. This is not a simple thing, so we must think about it bigger thing. On the first day, we separated science and global teams. We researched global warming issues to discuss and explain then each other. Moreover, we expressed our thoughts in words and exchanged opinions. I think talking with many people in other countries is important. Like me, Japanese students hesitate to speak up because they are afraid of failure. At this time, I tried to speak English even if my grammar was not perfect. The first day was a great opportunity to communicate difficult topics to others to the best of my knowledge. On the second day at first, the science and global groups came together to discuss the same topic and make a poster to give a presentation. By talking to them, I was able to get new perspectives that I hadn't considered before. It was a great time to spread my world. Speaking English to explain my ideas was difficult for me but I continued challenging. After lunch, we practiced making posters and presenting them. When I didn't know how to explain it, the overseas students and university students kindly explained it to me. I will talk about our presentation. First, we focused on whether the theme of climate action could be realized in the educational aspect of Japanese schools. The first idea is to create a new club where students can explore global environmental issues and global warming. The second idea is to explore these topics in math and science classes and present them in English classes. The first idea is to create a new club where students can explore global environmental issues and global warming. The second idea is to explore these topics in math and science classes and present them in English classes. The benefits of doing this are that it will make the students' parents happy, and it is thought to lead to local revitalization. The poster features the pheasant, Japan's national bird, which is the symbol of this activity, and conveys the message that we too should rise to become as strong as the pheasant. Furthermore, the title was “environment” written in kanji to capture the interest of the listeners. I was nervous when I first started speaking and couldn't speak well, but I got used to it as I gave more presentations. I was also fascinated by the amazing presentation skills of people from other countries, and I think my own skills improved. I was happy to receive praise from many people after my presentation. If I could not speak and take a communication well, other people had always have helped me. They were helpful to me, so I want to improve my English skills quickly and use them in the future. I also want to protect the Earth without forgetting the SDGs that I learned about this time.


"PROBLEMS"
Marine Biodiversity protection
Sustainability Fisheries
ocean data collection
Hello
Marine Spatial planning
Teaching Marine pollution
"SOLUTIONS"
Data science for fish conservation
1. Data collection
2. Time series analysis for trends
3. Sustainability metrics and performance
Waste management
1. reduce Plastic pollution
2. Promote circular Economy
3. support ocean cleanup initiative
Policies and Rules
1. establishing strong legal framework
2. International cooperation , T
3. Transparency Monitoring and surveillance
Marine conservation and eco-tourism
1. conservation of marine eco-system
2. sustainable economy opportunities
3. environmental education and awareness
Education and awareness
1. Protect our Ocean campaign
2. Marine education workshop and webinars
3. Beach cleanup campaigns

G1 SDGs14

So at the first day we just listened to a presentation from the professor talking about the impact of the nature on us and mainly focusing on the SDGs and how our world is trying to help the environment in various ways. We learned about our global issues with different aspects and we also had the chance to watch some short videos talking about the disaster that may happen to us and to our future world. After that we were separated into 2 teams the science team and the arts team and each group were again separated into a few groups. Each group had a task to think about an idea focusing on one goal of the SDGs. My team had to think about an idea that is related to the industry goal in the SDGs. I had so much fun talking with new people and expressing my ideas in English. It also helped me improve my English skills and to understand the importance of the group work. When we were thinking we especially focused on making each one of us express his idea and after that we thought about choosing only one idea from all the ideas that were said and also tried to put some of the other ideas into the idea we had already chosen to make it even better. After deciding the main theme of our idea we decided our idea into a few factors and each one of us searched about a factor. When that was finished we mixed all of our searches to come up with the final shape of the idea that is realistic and matches with our SDGs goal. After that all the groups that were thinking about the same goal of the SDGs no matter what team they r located in were randomly mixed and each new group had to share the ideas they got from the science perspective and the arts perspective to create a final idea and present about it to all other groups. It was quite successful at least for me because I felt my thinking and team working ability had developed and also because I made some great new friends and had some fun exchanging some thoughts about our daily life.

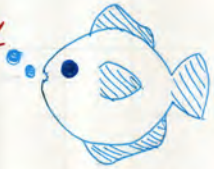
14 LIFE BELOW WATER

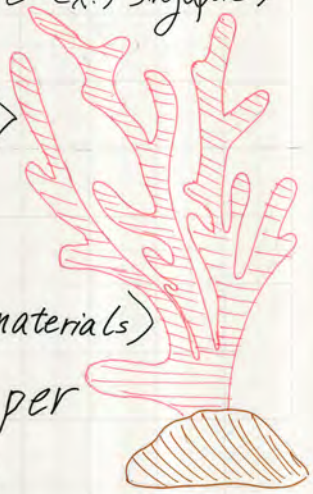
Plastic to Progress
Clear ocean Ahead

1) To get plastic out of the sea
- Ocean clean up project
  < gets plastic floating on top out of the sea by using a big net (most of the microplastic is on surface.)
- Beach cleanup drives
  < Incentives to encourage fishermen & people to collect garbage >

2) What to do with plastic from the sea
- Recycling & Upcycling
- Burning Plastic
  < create energy + ash → roads, building, etc ex.) Singapore >
- Melting plastic
  < Using waxworm saliva to melt plastic >

3) Replace plastic
- New materials
  < Research into the field of organically disolveable materials >
- Promoting use of cloth & paper
- Strict policy & Governance
- Programs. < community-led, educational >





G2 SDGs14

Our team's discussion theme was SDGs14: LIFE BELOW WATER. That is to protect the biodiversity under the sea. Our group consisted of three Japanese students, two exchange students from Germany, Pakistan, and Austria, as well as two teaching assistants (TAs) from Nagoya University, who helped guide our discussions. On the first day, we were divided into the science group and art group, each discussed the theme from their respective perspectives. I was in the science group. On the first day, we started by identifying the main issues related to SDG 14. It was difficult not only to express my own thoughts in English but also to completely understand my teammates'. However, we found three main problems.

1. Overfishing and illegal Fishing: These activities are causing a decline in fish populations.
2. Plastic Pollution: Plastic waste, which remain as microplastics, is harming marine life and ourselves.
3. Lack of knowledge: most of us don't know what the problem before we searched in the Internet so we add this for the problem.

We then divided into smaller groups to brainstorm solutions for each problem. On the first day, we have enough time to discuss and get to know each other better. I could actively participate in the conversation and understand the perspectives of my team members. On the second day, the two groups (science and art) that discussed about the same theme were combined. We formed new teams by mixing the members from both groups. In my group, only I wasn't good English speaker, so I was too busy to understand what we were discussing. There are so many ideas about the solution, because it was the collection of two groups' idea. We thought thinking solutions to every problem is impossible, so we focused on the 'Plastic Pollution', especially the microplastic, and thought some solutions for that. Microplastic are made by plastic waste. Plastic didn't decompose and remain in the sea. The fish eat the microplastic and through the food chain, as the result, we eat microplastic without knowing that, so we thought that is the most important problem of all them. The solution was written in our poster in the left.

Here's my reflection on the experience: I really enjoyed engaging in discussions in English with students from other countries. And I realized that SDGs was the topic that people from all over the world could discuss together. What was especially interesting was realizing that each person brought a unique perspective, likely influenced by their cultural background and environment. But most of all, I was very regrettable that I couldn't discuss well because, my English skill was not enough, and I didn't have enough knowledge about the global issues. This experience motivated me to improve my English and be expand the knowledge about the world. I hope I to join this discussion again next year and contribute more meaningfully

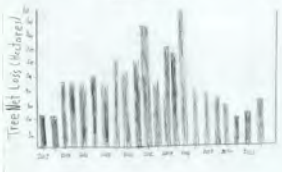
LIFE ON LAND

15 LIFE ON LAND

KEYWORDS:
FOREST, ANIMAL, CO-EXISTANCE, DEFORESTATION, INVASIVE SPECIES, DESERTIFICATION, FOREST FIRE, BIODIVERSITY, AGRICULTURE, GENERIC RESOURCES

DEFORESTATION

TREE LOSS



END DEFORESTATION AND RESTORE DEGRADED FORESTS

END DESERTIFICATION AND RESTORE DEGRADED LAND

PUBLIC AWARENESS

VOLUNTEER WORK
FUND RAISING

NEUTERING
PREDATOR INTRODUCTION

PESTICIDES

FIRE PREVENTION
TREE PLANTING

CONCLUSION

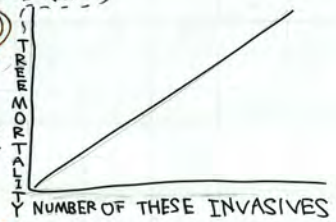
THE KEY TO SUSTAINING CO-EXISTANCE IS EDUCATION AND COOPERATION

INVASIVE SPECIES

KILL THE TREES

EMERALD ASH BORERS

DEER



COMPETE WITH LOCAL SPECIES

H1 SDGs15

Our discussion theme was SDG15: Life on Land. We will write here about the current situation, problems and solutions for them. Since there are so many problems and they link each other, we will focus on 2 problems here. First, deforestation is a serious problem all over the world.The left graph shows the monthly loss of trees in the United States. You can see the loss number increasing in June and August, and it's because of the forest fire. In other areas, illegal cutting, acid rain and more are also causes. As a solution for deforestation, we can do several things. For example, we can donate some money for nature conservation organizations. If you prefer more straight action, you can do some volunteer work like tree planting. Also, fire prevention or supporting sustainable forestry practices are effective ways. Second, invasive species also cause problems. In the U.S. , Emerald Ash Borer, an invasive insect, kills trees. In Japan, American crayfish eat local fish and it has been a problem these days. In general, invasive species which extremely kill local species or compete with them are harmful for nature. It leads to a collapse of local ecosystems, and so we have to deal with these problems. As a solution for the invasive species' problem, we came up with some ideas: public awareness, volunteer work, neutering, predator introduction and pesticides. As a conclusion, we can say that the key to sustaining co-existence is education and cooperation. We hope this event leads to raising environmental awareness and international understanding.

15 LIFE ON LAND

15:LIFE ON LAND

Alien Speciee:Racoon

Problems

- Increasing the number.
- Raccon bites make you sick.
- Crops are eaten by raccons.
- Get into houses and make noise.

SOLOTION

Pros

★ Protect
- Native species
- Forest

CONS:

- Government?
- Funding
- Released → What happens
- Time
- License for capturing

Protection of...
Biodiversity
Predation of Local Creature

Agriculture
The Amount of Damage 1.4M (yen)

Pathogens into Food

H2 SDGs15

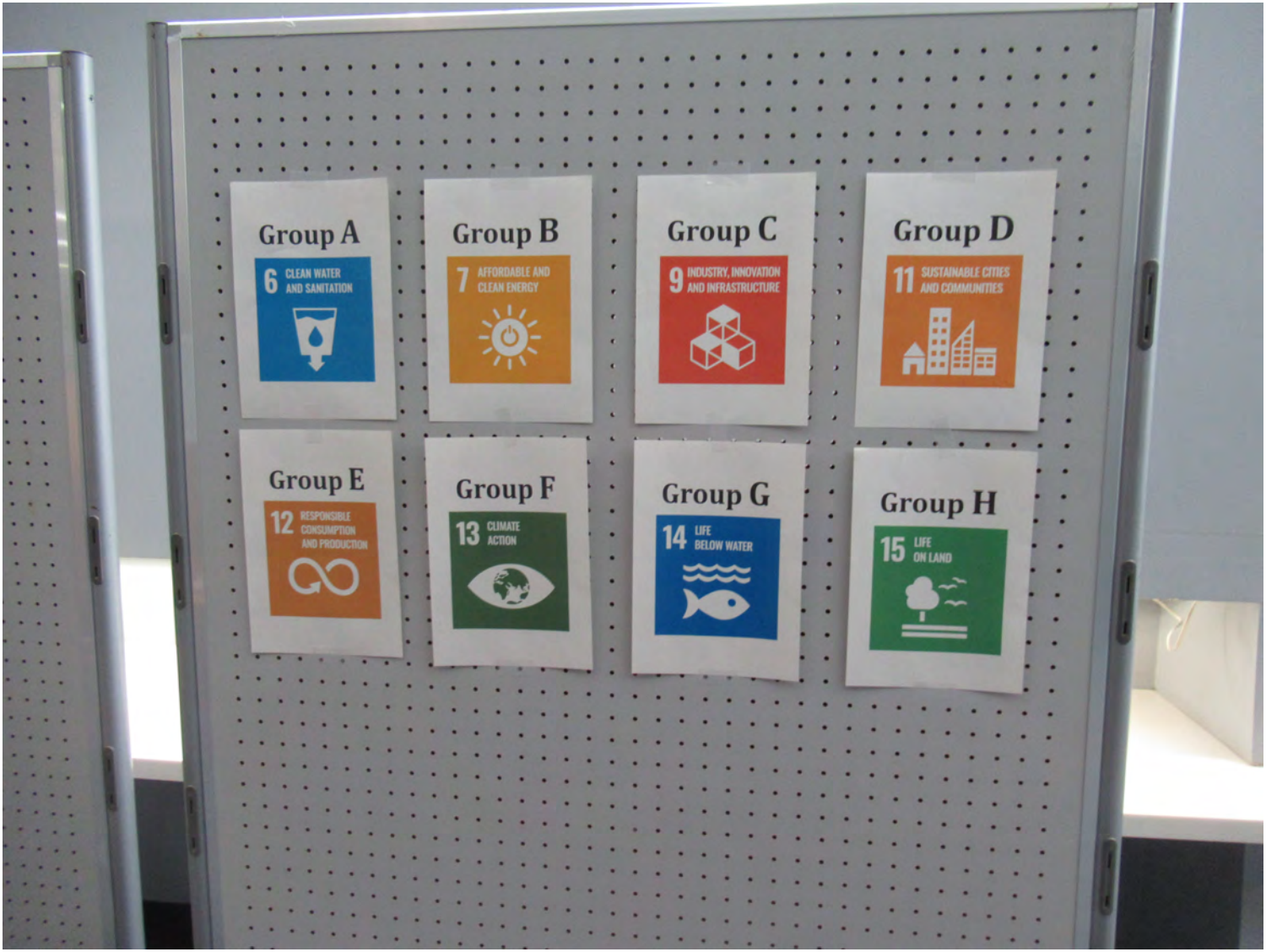
Our team discussed the 15th goal of the SDGs "Life on land". Our them is alien species' and we focused on raccoons. First of all, Japan has an endemic species of raccoon. It called tanuki. The tanuki has a rounded shape. And the tail is black, short and round, and it ears are black too. Paw is like a dog's. It is only found in Japan, China and part of Russia. Raccoons have a striped tail and black around the eyes. They have a white face and pow are like a fox. They are larger than tanuki. They live wild in the USA and Europe. And why raccoons in Japan? Raccoons were imported in the 1900s because of the popularity of an anime about a boy who raises a raccoon. One of the problems are that the raccoon population increases rapidly and the tanuki population decreases. It bites us and we get sick, crops are eaten by it and it gets into our house and makes noise. It comes down from the forest and harms our lives too. The solution to these problems is to reduce the number of raccoons. First, the government traps raccoons and sterilises them to prevent them from multiplying. We tag them so we know where they are. Next is most important. We give them a vaccination with a sterilising effect. If we did the vaccination, we wouldn't have to do the second step. But it needs a lot of money. Besides, we are not sure if there is a vaccine with this effect. After these steps we return the raccoons to the forest. No more raccoon babies will be born. This is the solution we thought. Next is Pros. We thought we could protect the tanuki and the forest. Because the raccoon eats same things with tanuki. And raccoons live in the same place as tanuki. So tanuki have been deprived of food and habitat by raccoons. Then the number of raccoons will decrease and tanuki can live where they used to. Also the number of tanuki will decrease, biodiversity will be loose. This is bad for the forest, which needs biodiversity. It's made up of many different species. Therefore, if the number of raccoons decreases, return to the original state and return various species habitats. Cons has five points. First, we need government help. Second, it needs huge funding. We thought almost materials are expensive. Third, we can't imagine what will happen after the raccoons are released. Fourth, it takes time to catch raccoons. Catching raccoons is a must in this plan. Fifth, we need a licence to trap animals. And it takes time to get a licence. There are disadvantages in solving the problem. Finally, there is the impact of this solution on other forms of life. This solution will prevent negative impacts not only on biodiversity but also on agriculture. Especially in terms of biodiversity, the predation of endemic species by raccoons has become a problem, as well as the deprivation of food for endemic species. This solution is also effective in reducing agricultural damage caused by raccoons. In fact, humans are also affected by raccoons. The economic damage caused by raccoons is estimated at 1.4 billion yen. Raccoons can also carry pathogens to human food crops. This is an explanation of the impact of the solution on other forms of life. These are things we have thought about.

In integrating these two ideas, the poster focused on the Science Group's idea of using smartphones and the Art Group's idea of using coupons. Some of the ideas that came out of the meeting were actually reflected in the posters, such as combining the map-related parts of the Science and Art Groups, or adding the Science Group's section on food circulation to the Art Group's section on points of interest.During the actual discussion, the poster was divided into several parts, and a person was assigned to each area to basically allow that person to do the work efficiently. Of course, Japanese people, much less first-year high school students, are not completely capable of hearing and speaking English, so we asked them to speak slowly, communicate by writing on paper, etc.

Snap shots


AFFORDABLE AND CLEAN ENERGY
COMIC.
Social media
How we would share.
Benefits:
- Easy to understand
- More interesting !!!
- Children can read !
- Easy to translate
- Easy to share.
+ Benefits the other SDGs. (SDG 12 SDG 13)
Do you know these types of energy??
Banana
Water
Wind.
Geothermal
Pineapple
Solar
QUIZ !!
Answer from the next chapter!


International
Student
203 Not found


Group A
6 CLEAN WATER AND SANITATION
Group B
7 AFFORDABLE AND CLEAN ENERGY
Group C
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
Group D
11 SUSTAINABLE CITIES AND COMMUNITIES
Group E
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
Group F
13 CLIMATE ACTION
Group G
14 LIFE BELOW WATER
Group H
15 LIFE ON LAND


H2
SOLUTION
15
Alien
Racoon Dog

Concluding Remarks

Srna Zafirovska
Nagoya University Affiliated Upper and Lower Secondary School

I would sincerely like to thank everyone who participated in realizing the 2024 Global Science Conference under the theme *SDGs: What We Can Do as High School Students*. The conference was held at Nagoya University and hosted high school students from various parts of the world who worked together and undertook the challenge of advancing the sustainability agenda. I believe this year was particularly challenging as students were required to think about their assigned SDG from both a science and an arts perspective. However, this interdisciplinary aspect of the 2024 Global Science Conference was also its main strength. By pushing the students to think in a multidimensional way, they got to experience the complexities of the real world and the interconnectedness of the SDGs. They learned that the advancement of sustainability is not the responsibility of a single individual or profession. In reality, the successful realization of the SDGs relies on policymakers, educators, scientists, farmers, artists and many other actors in society, not just within one country but across borders and nationalities. This conference replicated society on a small scale, where students from different academic and cultural backgrounds had to adopt a leadership position, communicate to find common ground, and devise a plan for advancing the SDGs within the course of two days. At first, I was slightly worried it might be too difficult a task, but they exceeded my expectations with their creativity and in-depth thinking. I also applaud the teaching assistants who guided the students and helped them deliver very coherent and persuasive presentations. The importance of a sustainable future is undeniable. While it is in humanity's nature to constantly evolve, development that comes at the expense of nature and human wellbeing is not progress in the right direction. Educational efforts such as the 2024 Global Science Conference are invaluable for equipping upcoming generations with the knowledge and skills necessary for treading the path to sustainability even beyond the completion of the 2030 Agenda.

ART BOOK – Global Conference among High School Students–
Published 2024
Published by Affiliated Upper and Lower Secondary School, School of Education, Nagoya University
Address: Furo-Cho Chikusa-ku Nagoya Aichi 464-8601
Phone number: ＋81-52-789-2680