



ASEAN
DATA SCIENCE
EXPLORERS



Air pollution-free *areas*

empowering changes for clean air toward a sustainable future for the ASEAN community

TEAM TITANS - THAILAND

NAPATCHA KAEWKUMNERD & PHAKAWAN SUTHISOPHON

MATER DEI SCHOOL BANGKOK



Which side would you prefer?



Unhealthy levels of
Air Quality Index (AQI)
in Thailand

Source: Pattaya Mail



Good levels of Air Quality Index (AQI)
in Australia

Source: Skyscrapercity

Objectives

To mitigate **air pollution** in the ASEAN region by promoting sustainable alternatives, engaging communities, advocating for policy changes, and fostering long-term environmental impact by following SDGs goals 3, 11, and 13.





What is happening in ASEAN?



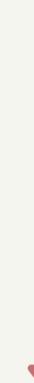
Why?

define problems



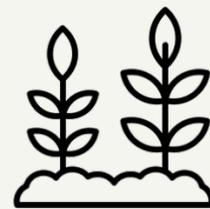
How might we?

recommendation



Our project journey

Problems resolved



What is the plan?



- implementation plan
- partnerships cooperation
- stakeholder framework
- project scaling

What is happening in ASEAN?



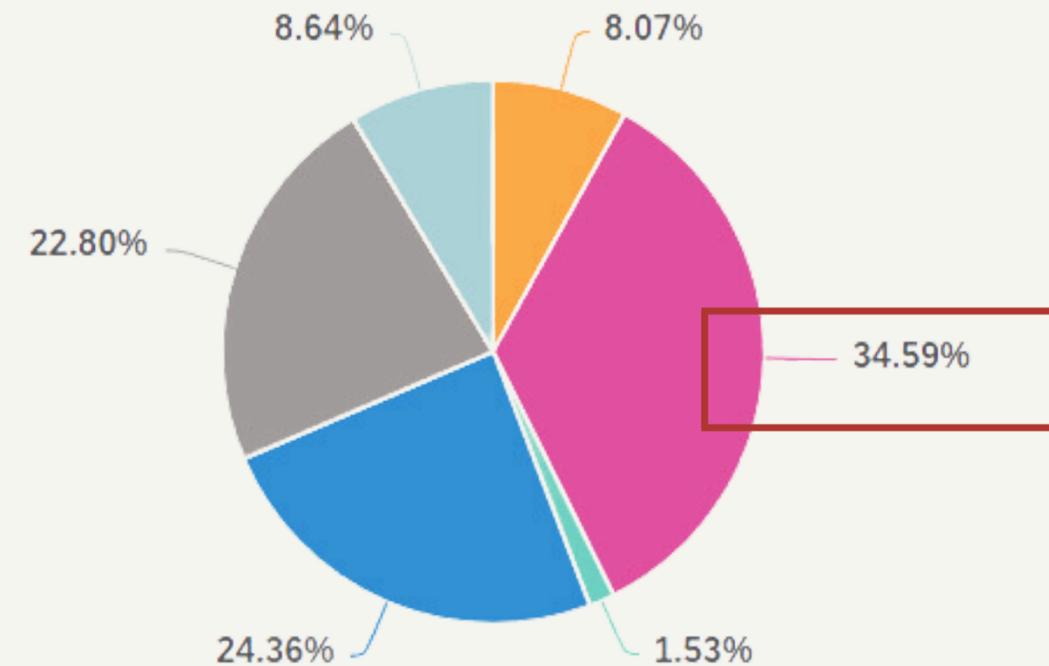
How serious is air pollution , and how much of a dilemma is it?

more than
1/3
of global CO2 emissions
is from Asia

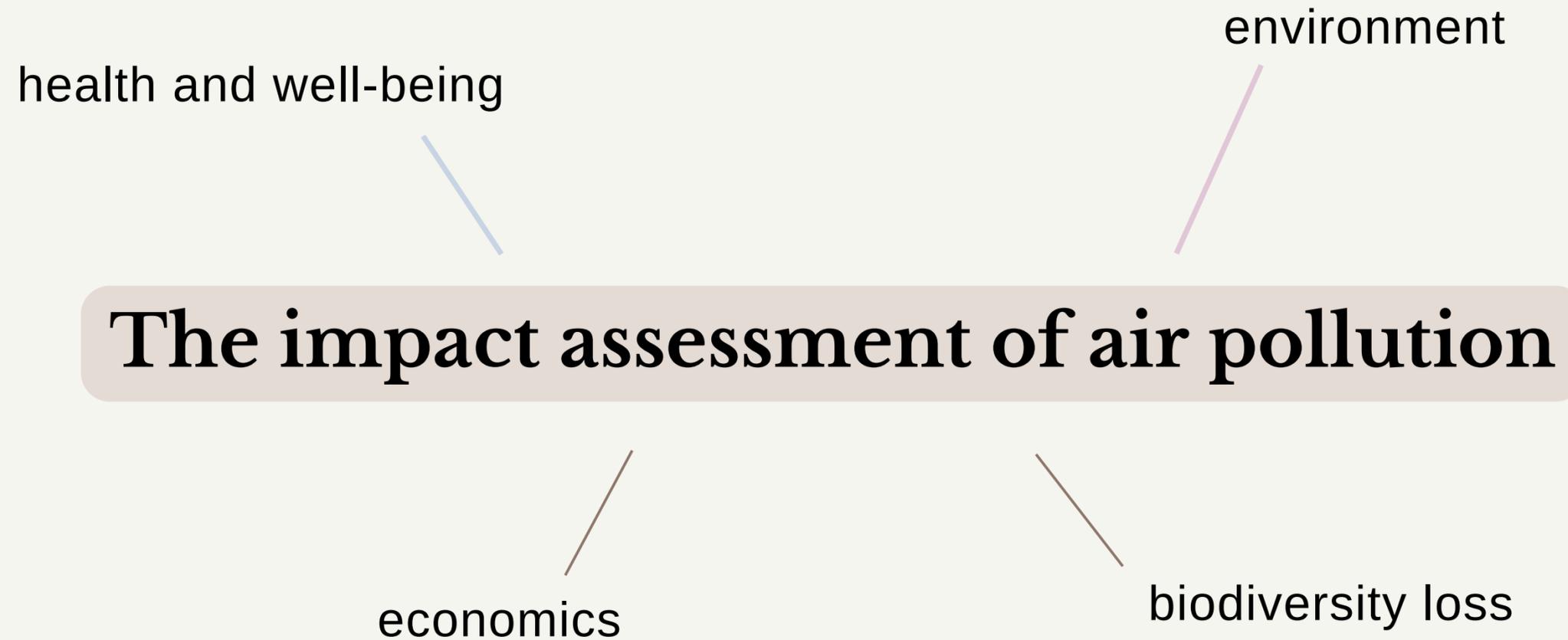
total greenhouse gas emissions in CO₂ equivalents per Entity in each continents

1 Filter

Africa Asia Australia Europe North America South America



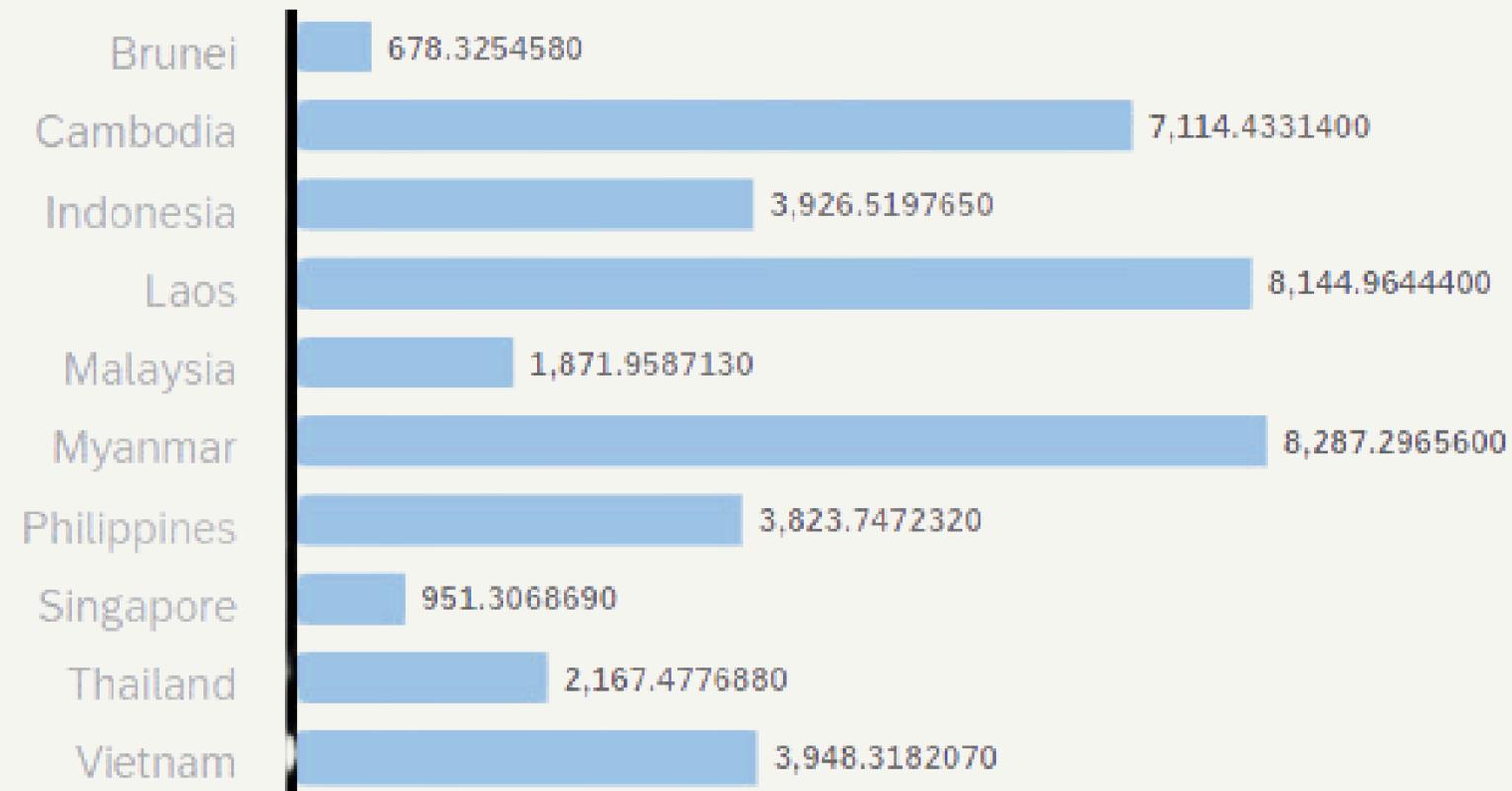
The **Asia** region had **the greatest total gas emissions** compared to other continents.



1 Health and Well-being

Deaths that are from all causes attributed to air pollution per 100,000 people, in both sexes aged age-standardized per Entity for Actual

1 Filter



99%

of population in ASEAN live in areas where air pollution exists

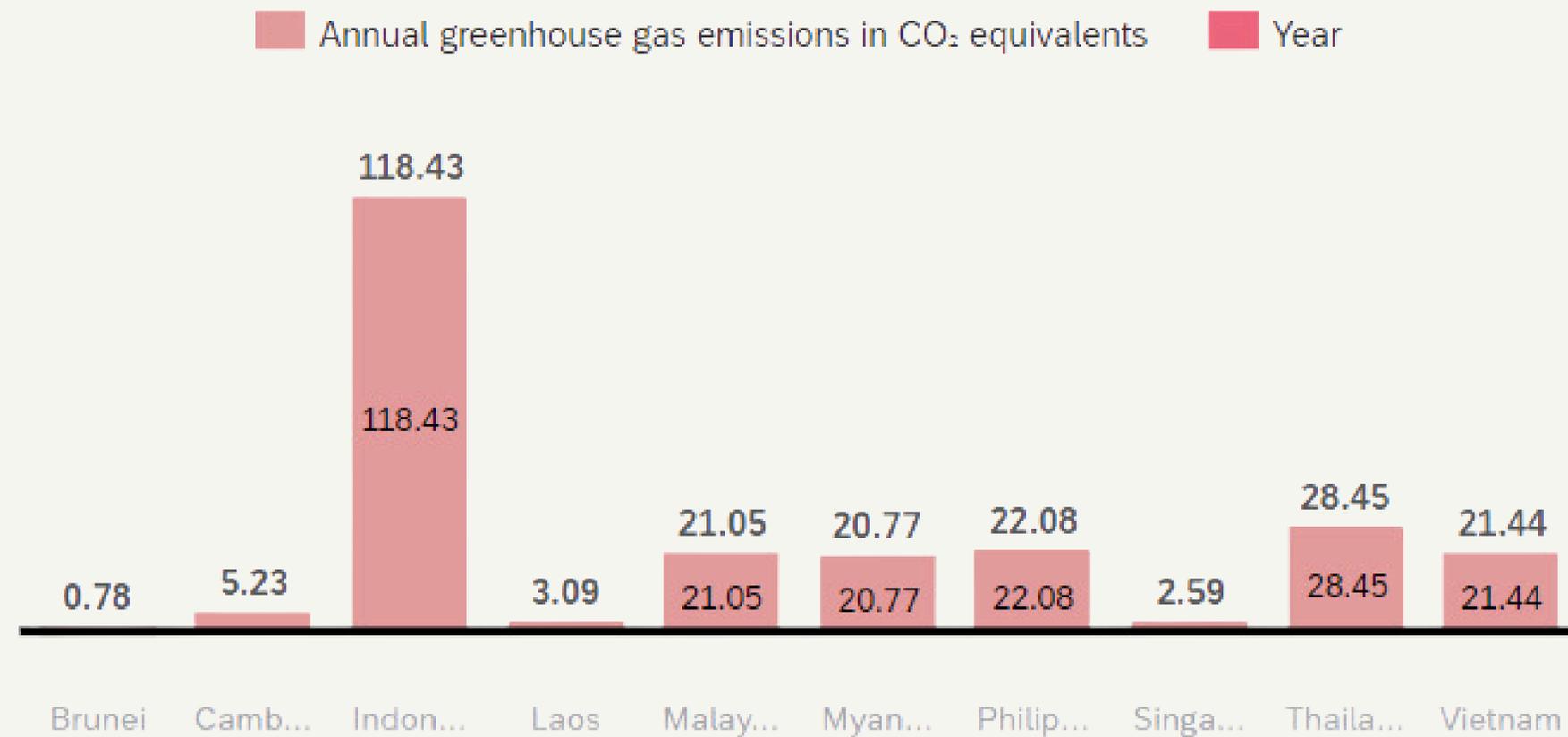
37 40

most polluted cities in the world are located in Southeast Asia

2 Environmental

Annual greenhouse gas emissions in CO₂ equivalents, Year per Entity for Actual

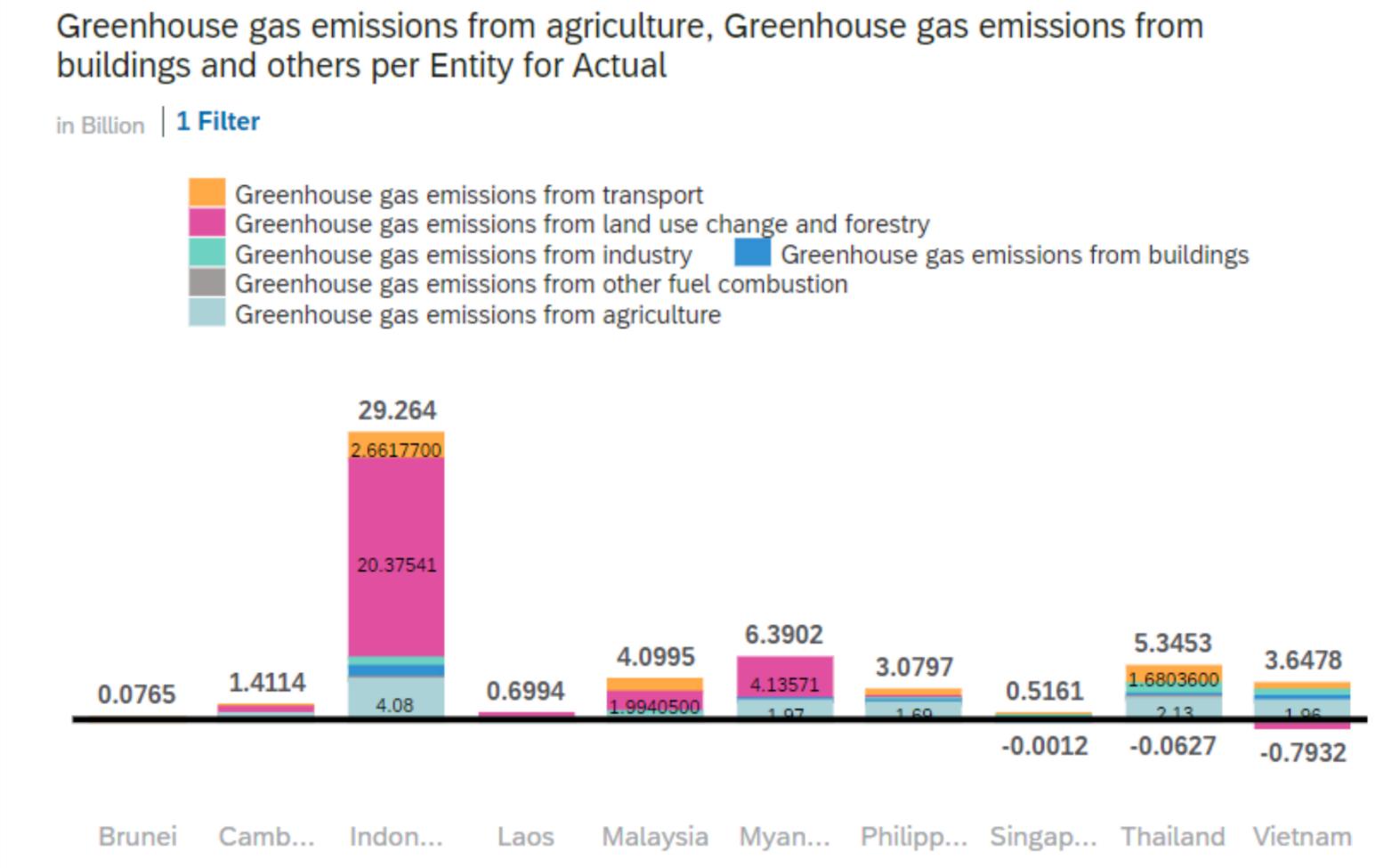
in Billion | 1 Filter



**What have been the circumstances
of air pollution in ASEAN?**

?

What is ASEAN's main contributor to GHG emissions?

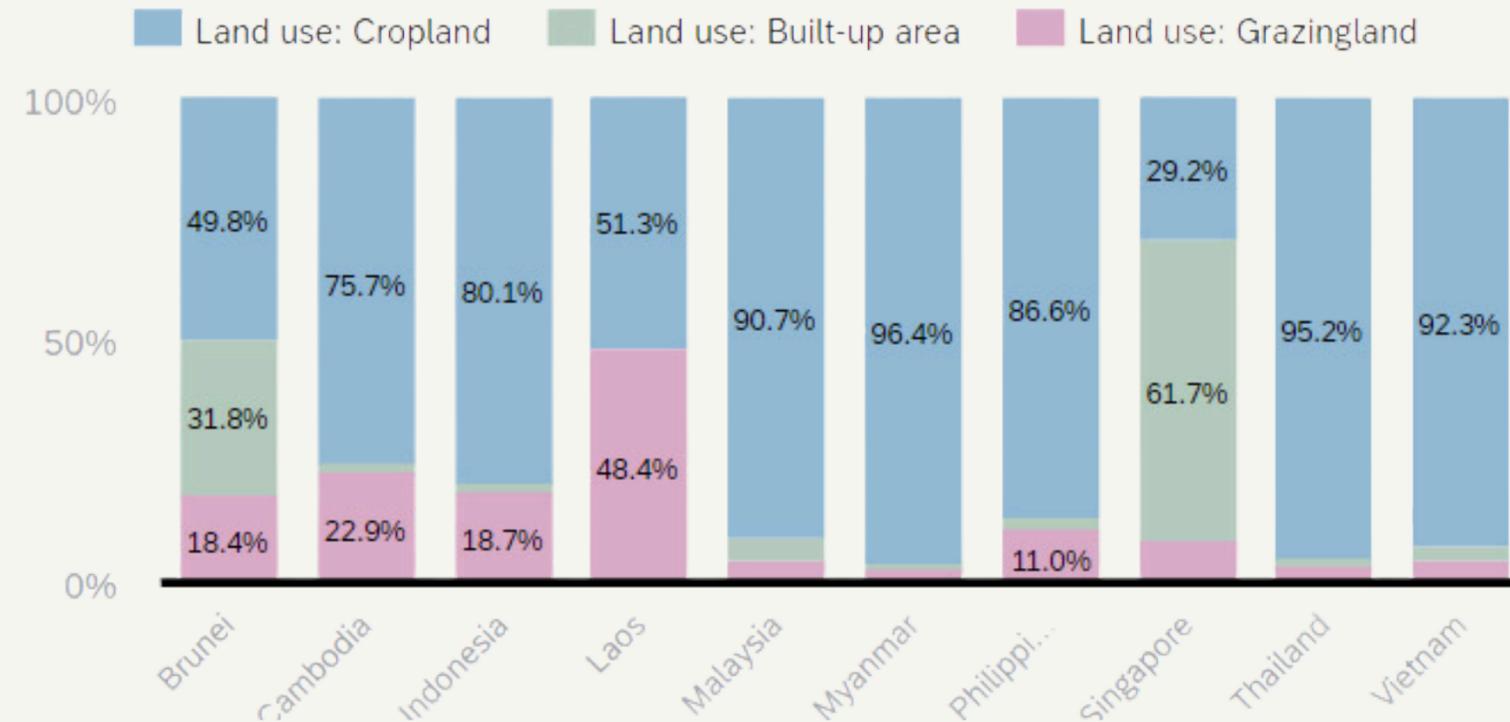


The main contributor is **land use change and forestry** which are contributing to **severe air pollution**.

Specifying land use change and forestry

Land use: Built-up area, Land use: Cropland and others per Entity for Actual

1 Filter

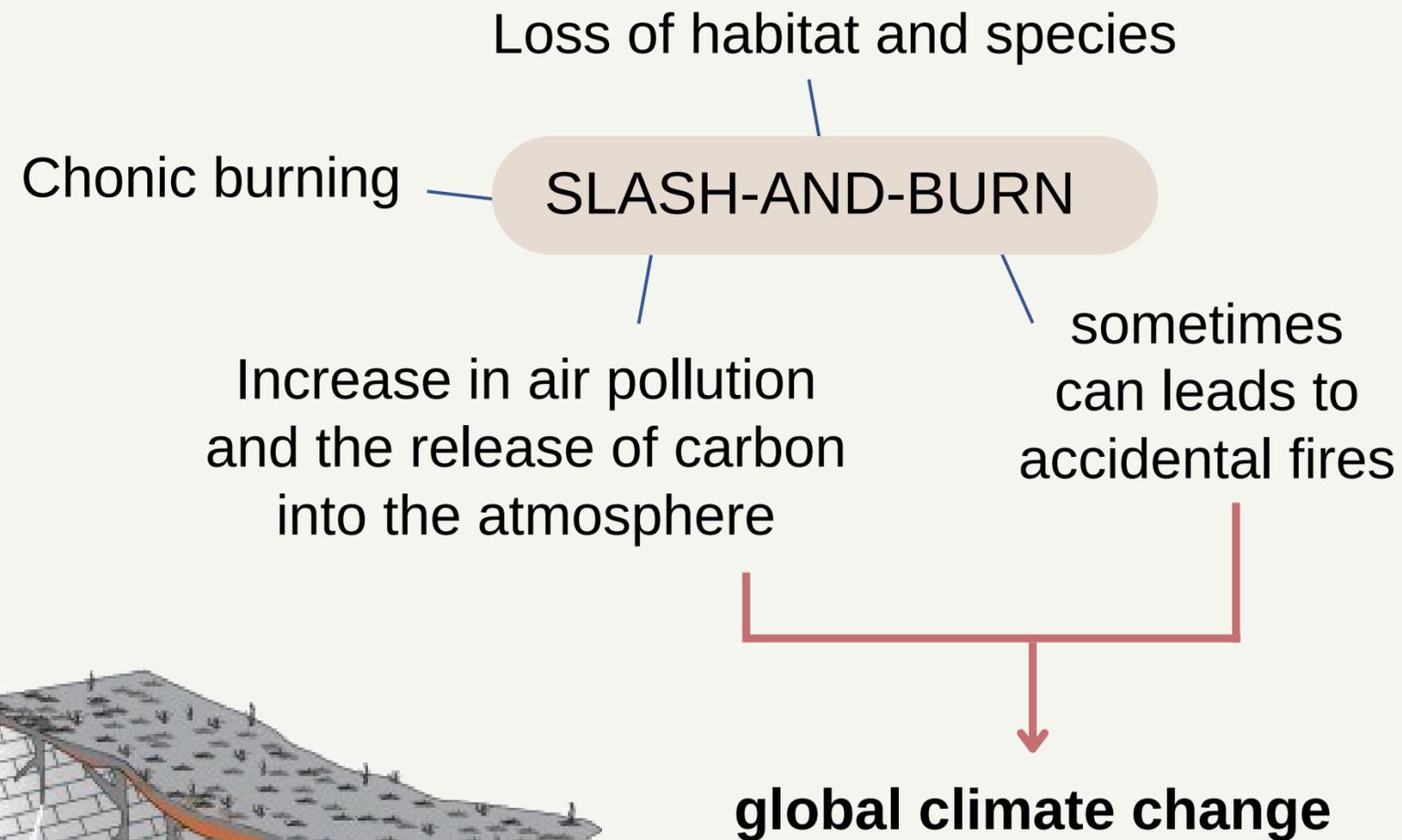


The bar graphs indicate that **cropland** covers most land use area in the ASEAN region, utilized for **agricultural purposes**.

SLASH-AND-BURN

(known as Agricultural Burning)

SLASH-AND-BURN is a farming method that involves burning forests and emptying spaces for planting.



Why **SLASH AND BURN** considered as a big problem in Asean's air pollution?



Agriculture is one of the **key players** in the ASEAN.

There is **more occurrence** of SLASH AND BURN compared to other regions.



Chronic Burning



Widespread

SLASH-AND-BURN

In recent years, with an increasing worldwide awareness of environmental issues, SLASH-AND-BURN in tropical forest areas has been identified as **a significant contributor to deforestation** and is considered a problem.



The top 3 countries with **the highest** percentage of Agriculture in the ASEAN region.



Indonesia



Laos



Vietnam

Agriculture in ASEAN is valued highly in comparison to other regions.

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The SLASH AND BURN technique has been practiced for a long time with **unresolved impacts**.



Widespread

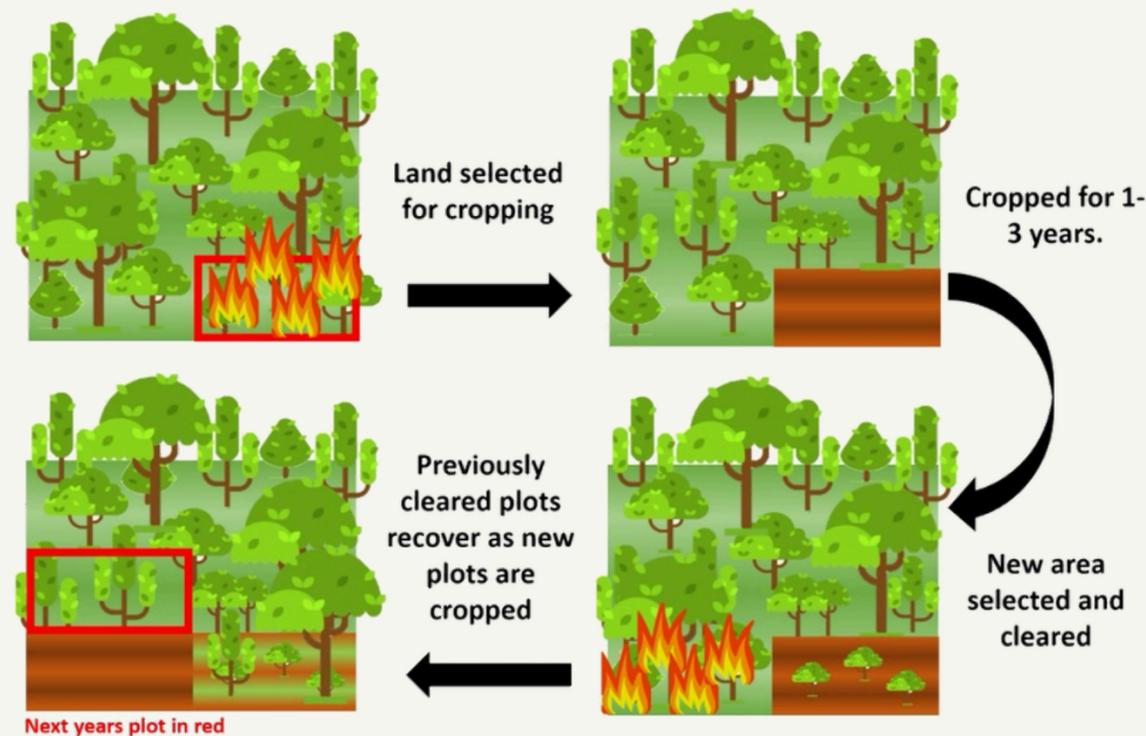
SLASH-AND-BURN

"Slash-and-burn continues the same process, repeating the loop repeatedly."

SLASH-AND-BURN has not been solved over the recent years

Reasons

- 1 Economic pressures
- 2 Lack of awareness
- 3 Policy gaps



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Widespread

The Haze that is created can spread so far as to **affect all** ASEAN member countries.

Case Study

Situation

The haze from SLASH-AND-BURN in Kalimantan and Sumatra, Indonesia.



resulted in

Blanketed large parts in Indonesia, Thailand, Singapore, Brunei, Philippines, and Malaysia. (Which was worsened by the El Niño effect)

News

Singapore Cooperation with Indonesia in Combating the Haze: Mitigating Forest Burning for Cultivation



Indonesian forests are burning, and Malaysia and Singapore are choking on the fumes

Climate & Energy | Climate Change

Indonesia defends haze-fighting effort after Malaysia urges action

By Ananda Teresia

October 6, 2023 1:51 PM GMT+7 · Updated 8 months ago

The Role of Indonesia in Association of Southeast Asian Nation (ASEAN) in Dealing with Haze and Air Pollution

From this situation, it can be concluded that:
The Haze from SLASH-AND-BURN spread so far as to affect all ASEAN member countries.

Why SLASH AND BURN considered as a big problem in Asean's air pollution?



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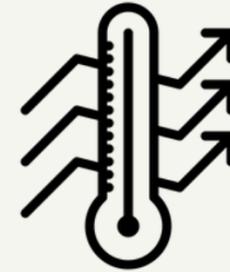
Widespread

The Haze that is created can spread so far as to **affect all** ASEAN member countries.

Air pollution problems nowadays are worsen by

the El Niño effect

The El Niño effect is a climate pattern moving to Asia from the Pacific, which brings hot and dry conditions to Southeast Asia.



How are we going to resolve these issues?



Introducing “CarbonSeeker”

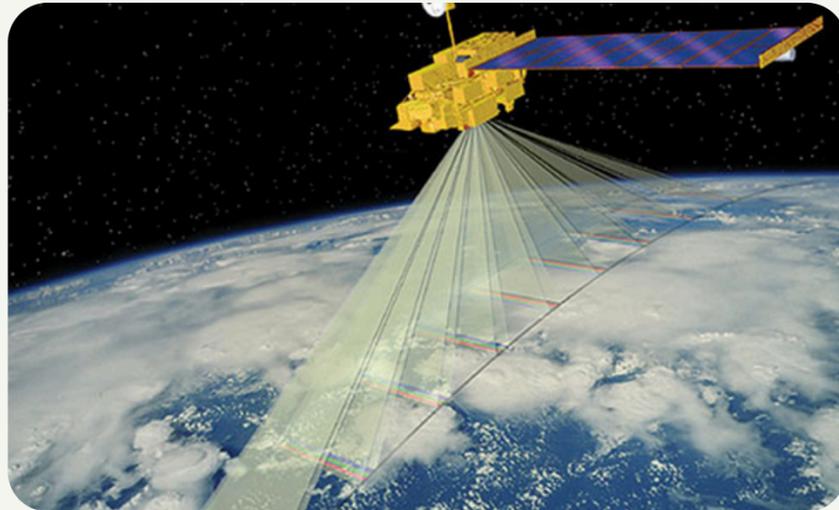


“CarbonSeeker” is an application designed to **monitor** haze pollution from SLASH-AND-BURN activities, while also providing tools and healthcare services to **support** the farmer community.

Technologies Used in Fire Detection

Satellite

Successful case sample



NASA's MODIS

- They use to monitor **wildfires** across the globe.
- The satellite's **infrared sensors** detect thermal anomalies

Drone

Successful case sample



📍 Ukraine, Kiev

They measured air quality with the support of a equipped with **gas sensors**.

Satellite	Carbon Detectors	Drone
Delayed Data Transmission	real-time detection and data transmission	real-time detection and data transmission
Large coverage area	Small coverage area	Targeted Monitoring in Remote Areas
Infrequent Passes	frequent data updates	frequent data updates
CO ₂ , NO ₂ , ozone, surface temperature, broad imagery	CO ₂ , greenhouse gases, particulate matter (PM2.5, PM10)	air pollutants (CO ₂ , CH ₄ , PM), location, and photographic evidence

Why CarbonSeeker uses drones as a data collector?

Detailed and specific data are essential for real-time **monitoring particular locations** for comprehensive wildfire detection and rapid response.



making **drones**

highly suitable for CarbonSeeker application



drones

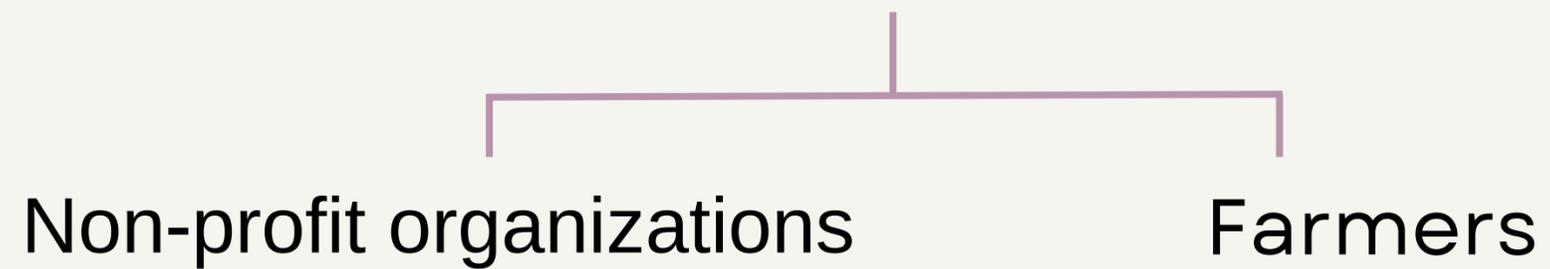
- **High-resolution data collection** (including air pollutants, GPS, and photographic evidence)
- **Real-time** monitoring
- Access to **Hard-to-reach areas** especially in rural and forested areas
- **Cost** effective
- Can measure **different pollutants** (e.g. PM2.5, PM10, CO2, SO2)

CarbonSeeker also **integrates data** from satellites into our system, creating a comprehensive solution.



By combining these technologies, these technologies ensure comprehensive wildfire detection, tracking, and rapid response.

CarbonSeeker's Target Users



Application Prototype

Please note that this application is currently in the previewing state

sign in page



organization/farmers

Select option ▾

Phone number, username or email

Password

Sign in

organization page



Real Time Data

Time Location

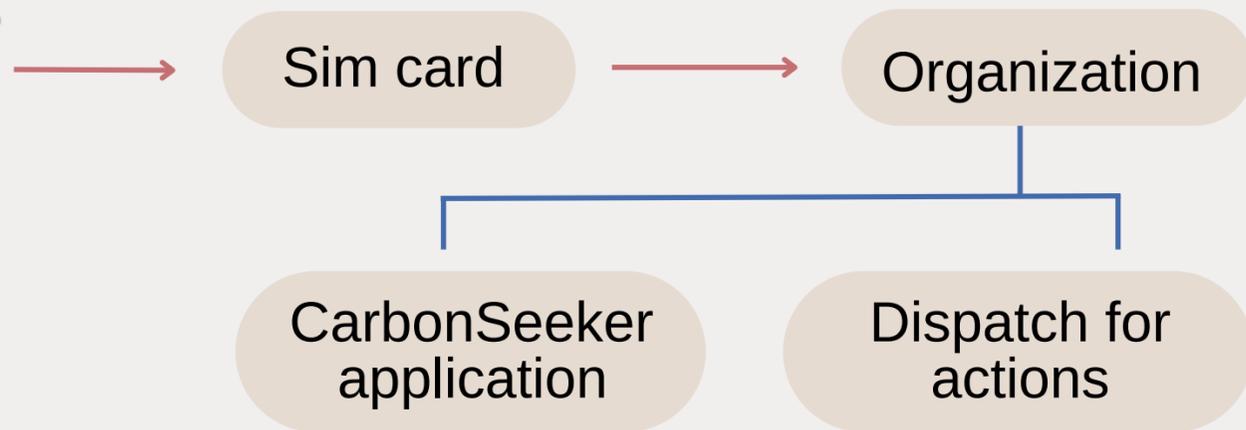
Temperatures Cardinal Direction

Organization can view **all insight data & collect them** from drones.

CarbonSeeker's process for organization users (farmers)



- Step 1 : **Educate Farmers** on SLASH-AND-BURN impact and alternative ways of farming techniques.
- Step 2 : **Support System**: provide resources include tools and equipment for sustainable farming.
- Step 3 : **Apply Penalties and Incentive**: Enforce penalties for non-compliance



Data collected from drones

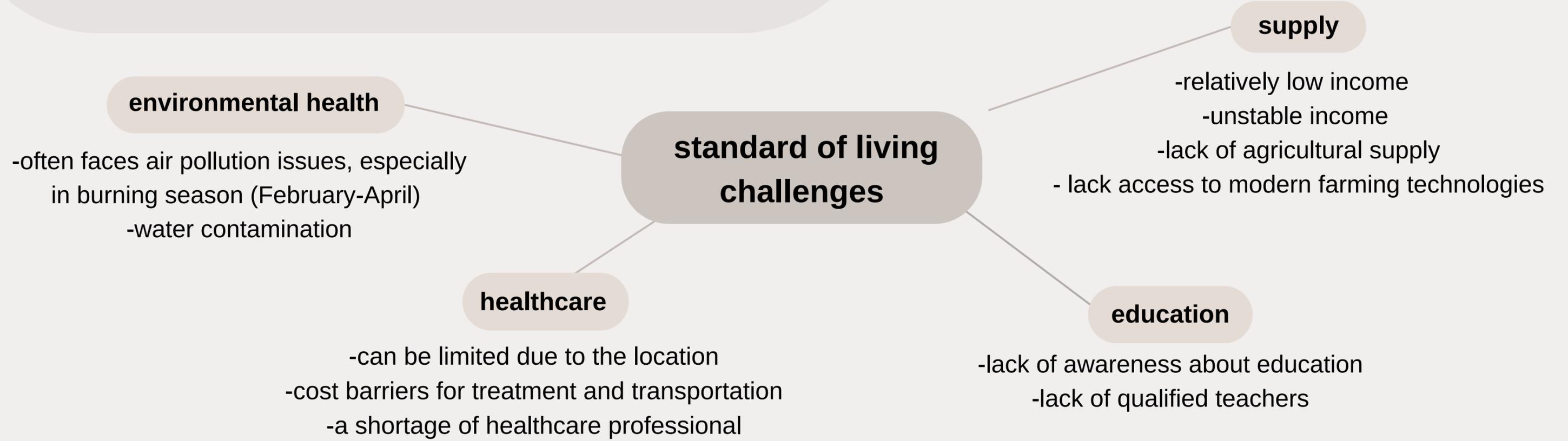
- 1. Air pollutant concentrations
- 2. Geospatial data
- 3. Time series data
- 4. Meteorological data
- 5. Infrared imaging
- 6. Photographic evidence

CarbonSeeker's process

for users (farmers)
organization



User Persona Instance
aunt mhutoon
age : 45
occupation : Sugarcane farmer
nationality : Thai
work place : Mueang Lop Buri, Thailand



Case Study Area



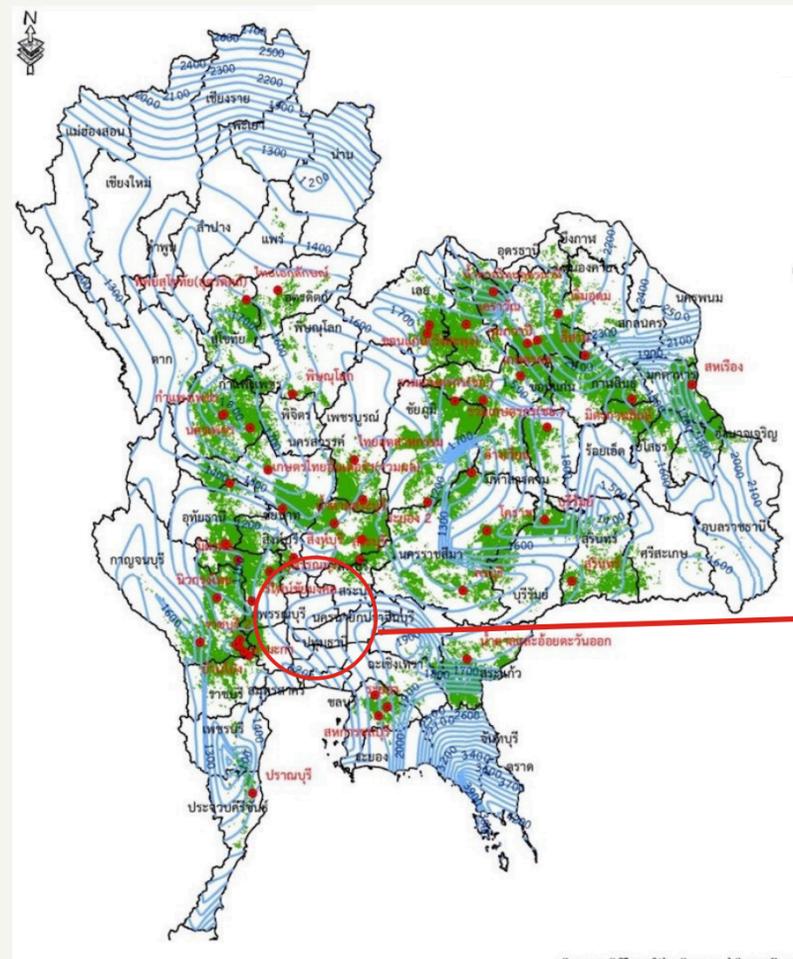
📍 Khok Salung, Phathana Nikhom District, Lop Buri, Thailand

56,000 hectare (350K rai)
20%
of total planted area

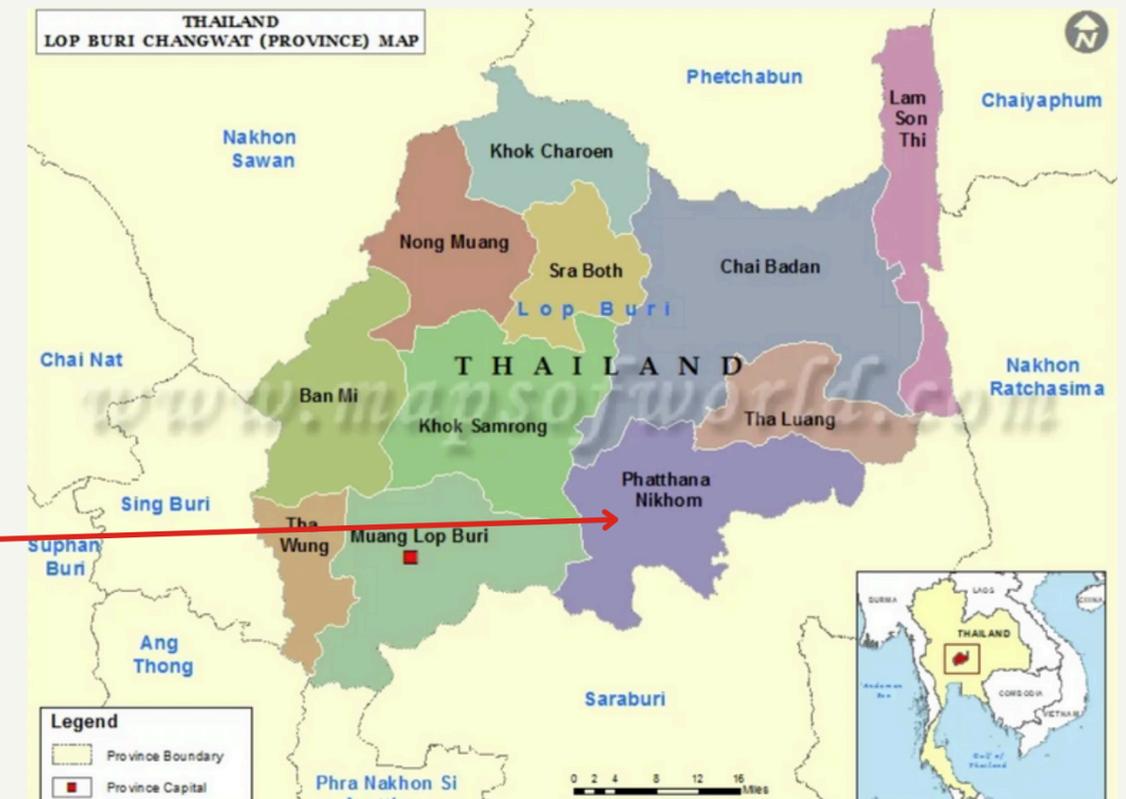
"Lopburi has sugarcane farmers who burn their sugarcane before harvesting across 200,000 rai."

-Settha Taweessin

former Prime minister of Thailand



Green Area: Sugarcane farm
Thailand Sugarcane Map

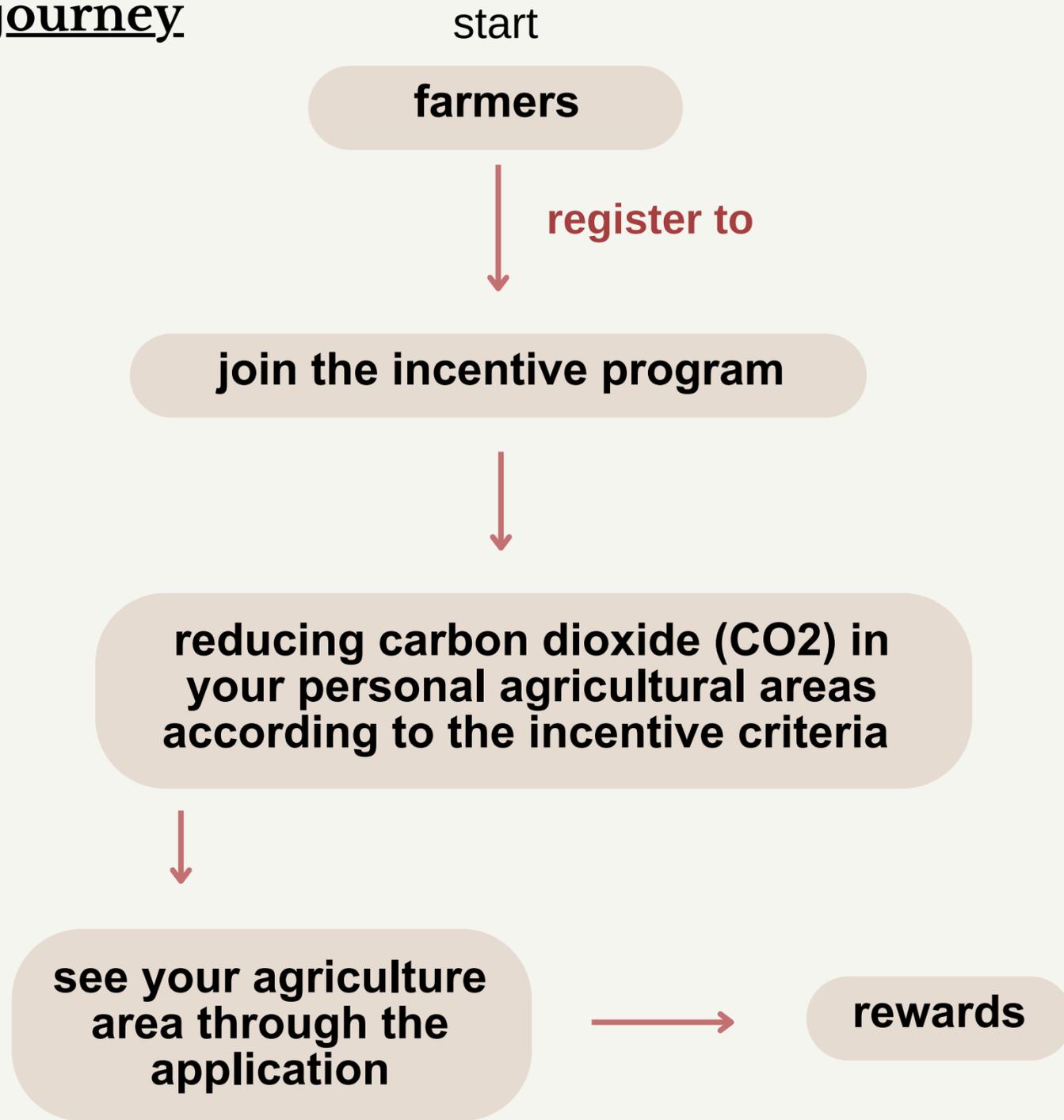


Lop Buri Province Map

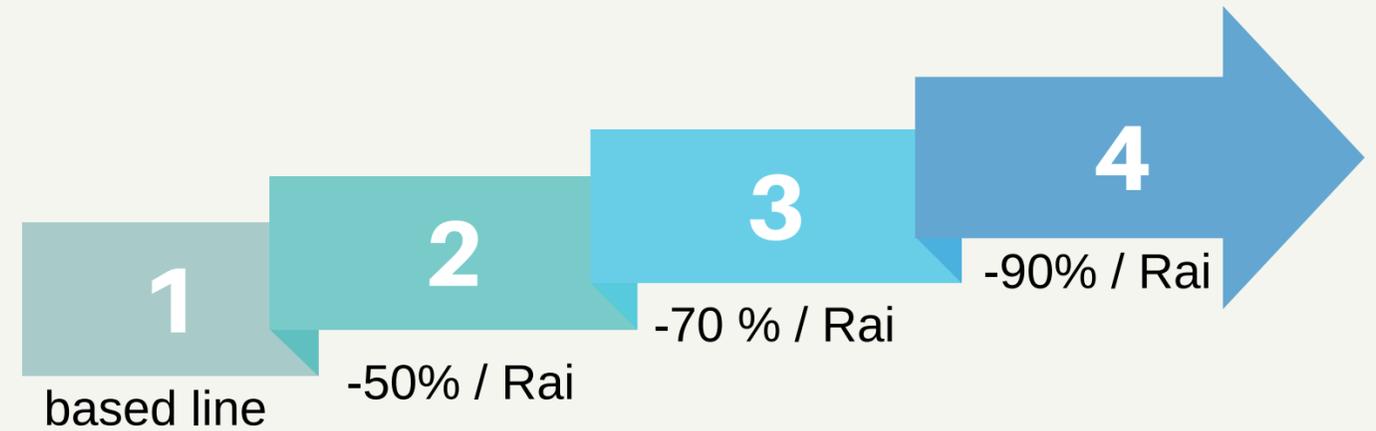
CarbonSeeker's process

for users (farmers)
organization

user journey



Incentive Program Criteria



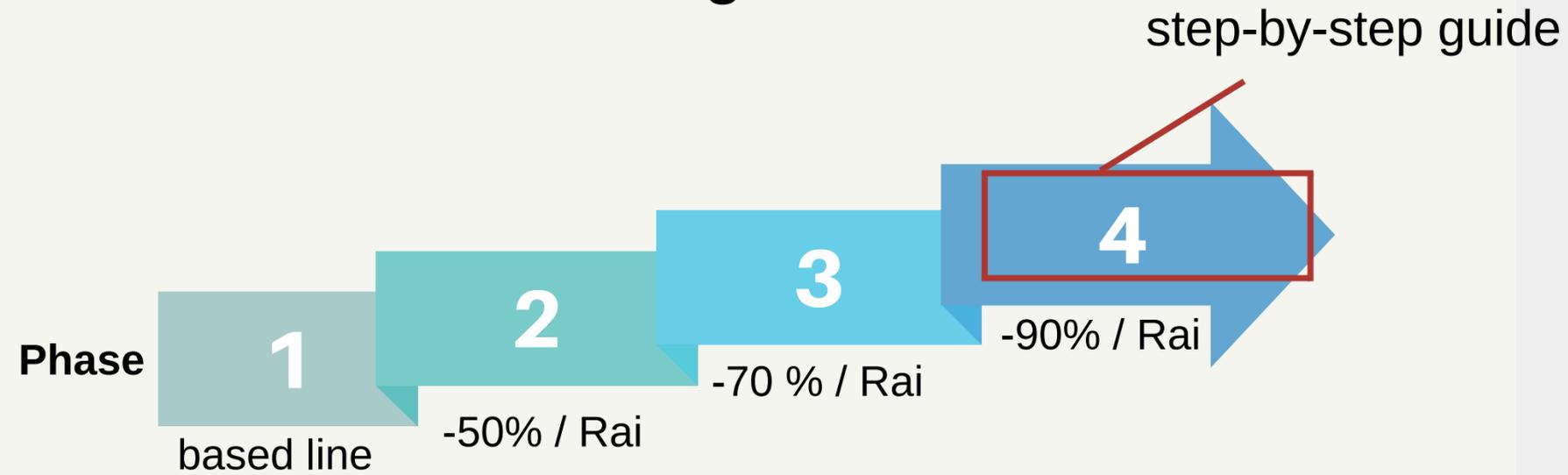
shows the target reduction of CO2 emissions that farmers should achieve over the period

1 Hectare (Ha) = 6.25 Rai

CarbonSeeker's process

for users (farmers)
organization

Incentive Program Criteria



shows the target reduction of CO2 emissions that farmers should achieve over the period

1 Hectare (Ha) = 6.25 Rai

What will farmers get after completed incentive program?

Reward Steps

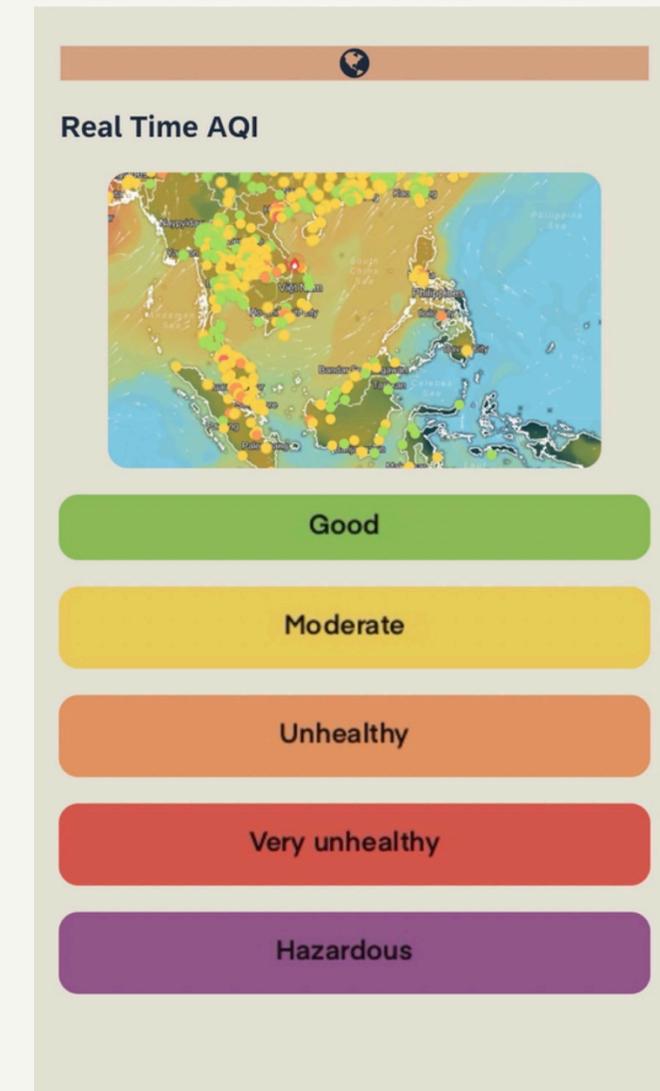
- | | | | |
|----------|--------------------------------------------|----------|------------------------|
| 1 | Air pollution data and education resources | 3 | Partial financial aids |
| 2 | Online healthcare access | 4 | Full financial support |

1 Air pollution data & educational resources



Education resources encourage **understanding and awareness** of agriculture.

Please note that this application is currently in the previewing state



Farmers can see the real-time **Air Quality Index (AQI)**, which includes air pollution in each agricultural areas.

2 Online healthcare access

Please note that this application is currently in the previewing state

Burning is a way of putting your own health at risk!

need help?

Nearby healthcare centers

	Titans Health Centre	7km
	Mhu Deng Hospital	13km

Consult Telemedicine Services

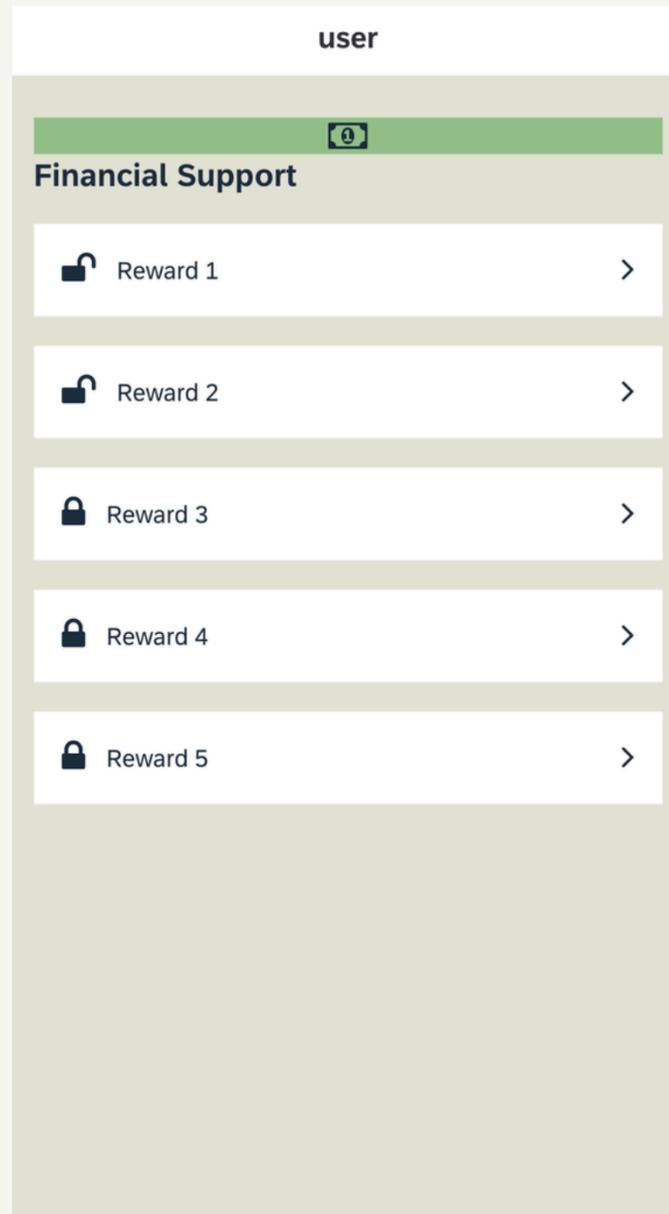
Farmers can consult healthcare professionals through telemedicine services.

Connect with Local Healthcare for Direct Support

Encourage farmers to engage with local healthcare centers.

3 Financial and tools support

Please note that this application is currently in the previewing state



Funding support for farmers'
communities and farming implements.

- Will be able to access affordable tools
- Reducing input costs for farmers

Provide support for farmers' transition to more sustainable and profitable methods.

CarbonSeeker



Root problems of SLASH-AND-BURN

1

- Economic pressures
- Low-cost farming
 - Poverty

2

- Lack of awareness
- Limited knowledge
 - Lack of accessible education

3

- Policy gaps
- Weak enforcement
 - Lack of incentives

Why CarbonSeeker? solutions

Funding support

- Invest in sustainable farming tools and technology

Accessible educational resources

- Knowledge & awareness about agriculture

Organizations

- Get additional resources
- Easier to connect and support farmers

“As everyone in ASEAN collaborates by using our recommendation, we can reduce the widespread impact on neighboring countries as well”

Problems will be solved



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Chronic Burning

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Widespread

The Haze that is created can spread so far as to **affect all** ASEAN member countries.

implementation plan

and partnerships cooperation

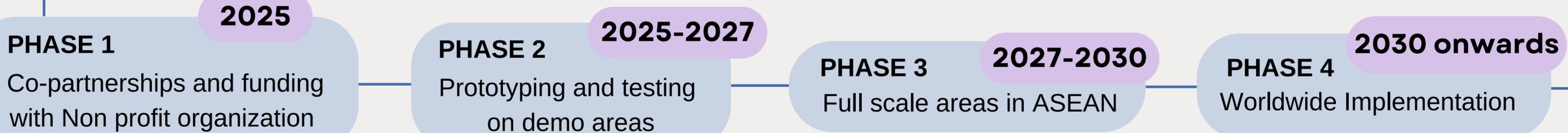


implementation plan

Including phases to empower clean air and create a sustainable future for the ASEAN community

start

Implementation plan



Partnerships cooperate

Thailand



ASEAN



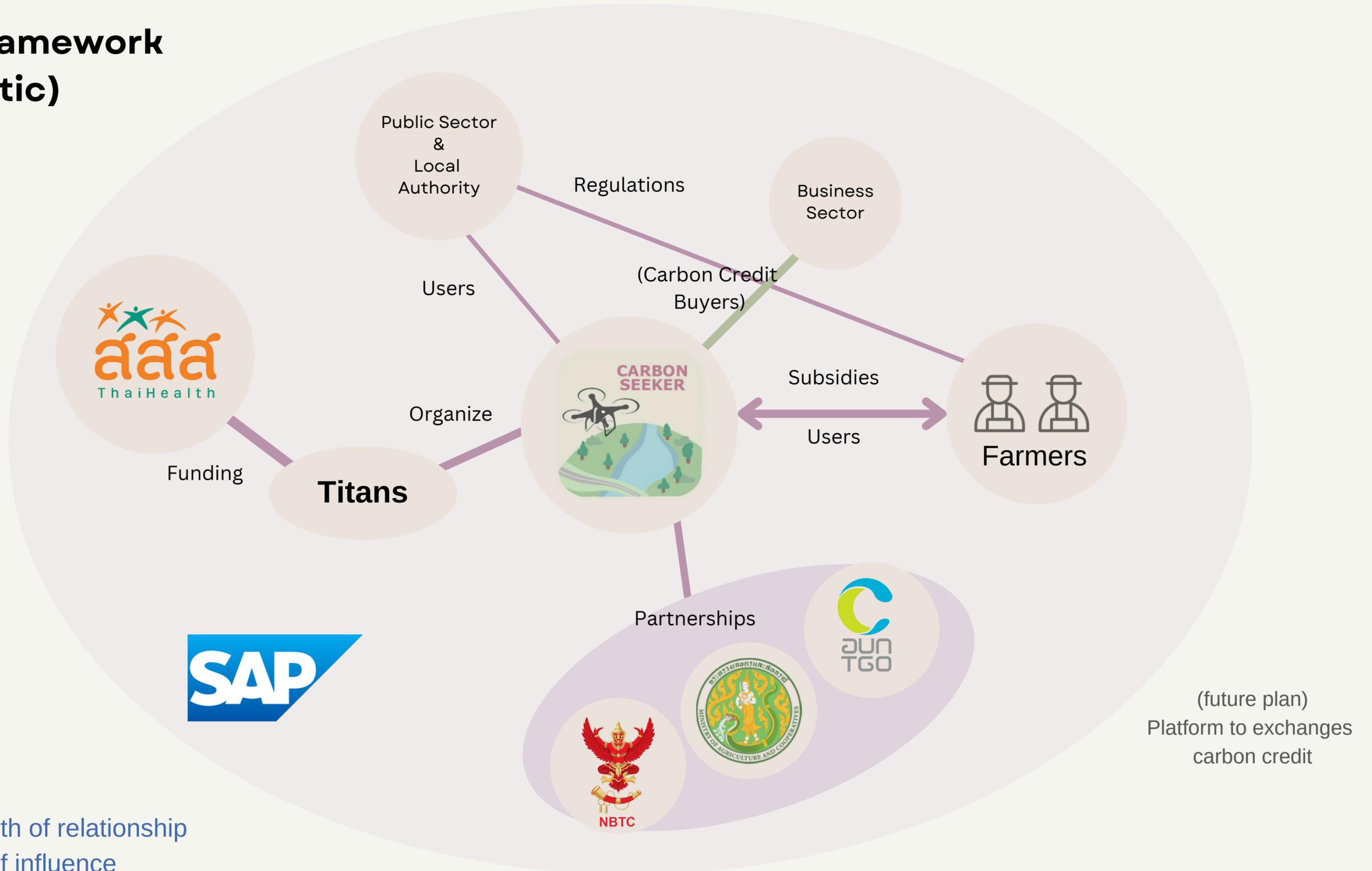
Worldwide



Partnership Cooperation (Domestic)

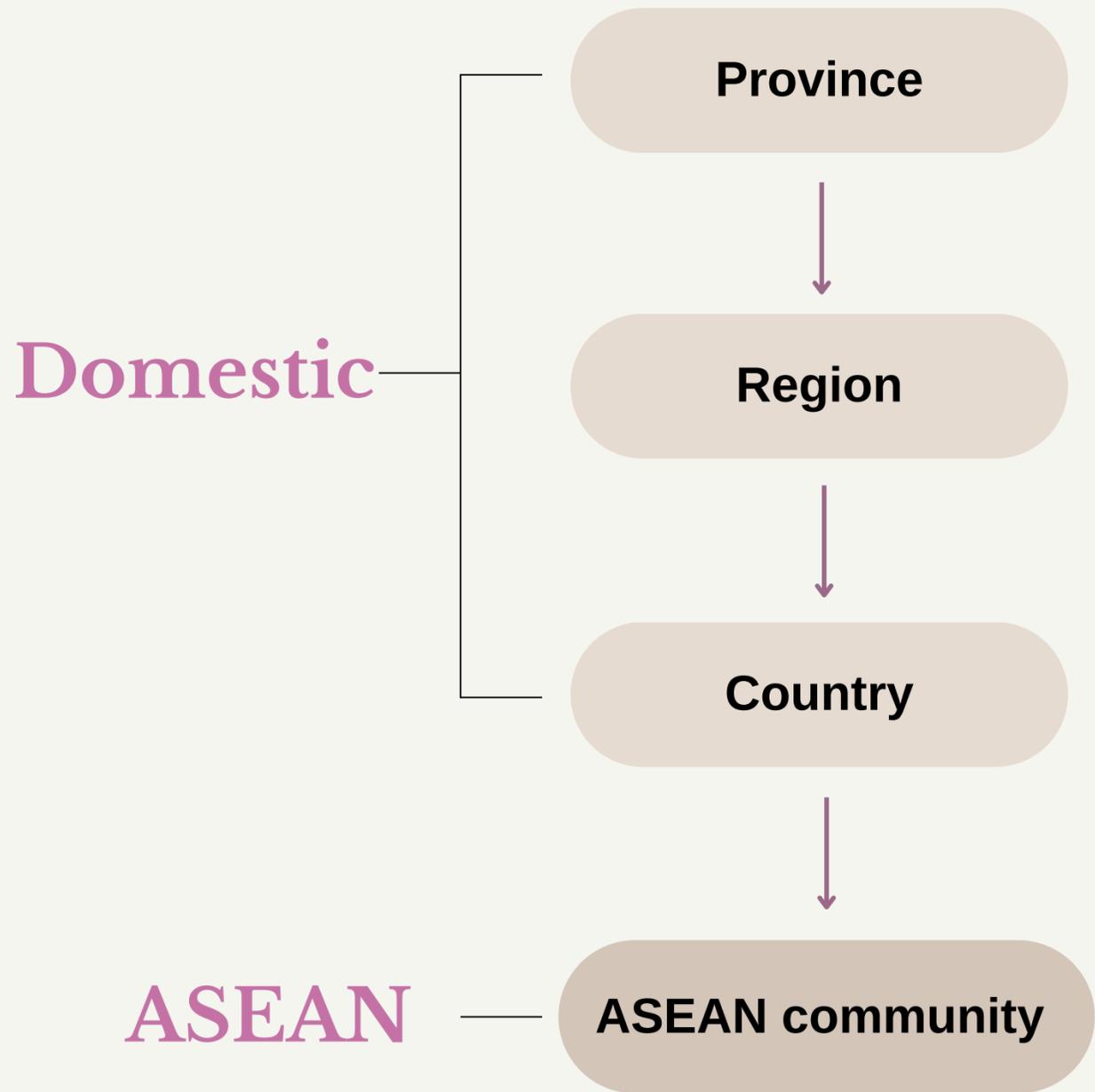
Organizations	Thai Health Promotion Foundation	Thailand Greenhouse Gas Management Organization	Ministry of Agriculture and Cooperatives	Office of The National Broadcasting and Telecommunications Commission
Will be contribute in?	<ul style="list-style-type: none"> • Provide financial support for the development and implementation • Assist in scaling the project to cover broader regions 	<ul style="list-style-type: none"> • Strengthened carbon footprint reduction. • Data and expertise to enhance sustainability 	<ul style="list-style-type: none"> • Access to real-time and historical agricultural and farmers data • Collaborate with local authorities 	<ul style="list-style-type: none"> • Ensure all drone activities • Permission for Drone Usage • drone licenses/permits.

Ecosystem Framework (Domestic)

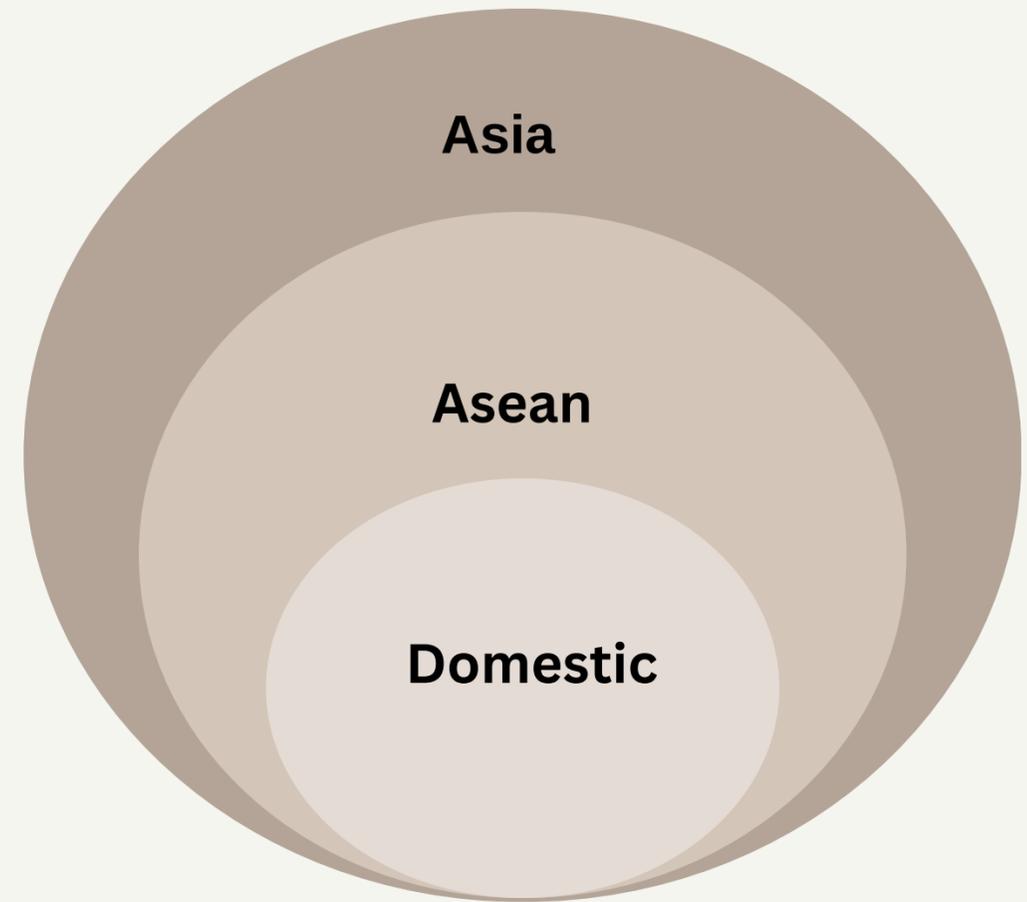


Line thickness = strength of relationship
Bubble size = degree of influence

Work process



Project Scaling



By using our CarbonSeeker, problems stated **will be resolved**



better air quality



farmers' life quality



Reduce respiratory illnesses



economics improvement



meet the SDGs goals

THE RECOMMENDATION is strongly associated with:

Sustainable Development Goals

Our recommendation



Goal 3 : Good Health and Well-being

Reduce illnesses and death from hazardous chemicals and pollution

CarbonSeeker application



Promoting healthcare to lessen illness concerns and offer online access.



Goal 11: Sustainable Cities and Communities

Reduce the environmental impact of cities

CarbonSeeker application



Encourage individuals to be environmentally conscious in order to better their quality of life.



Goal 13: Climate Action

Integrate climate change measures into policies and planning

CarbonSeeker application



Promoting alternative way of farming methods instead of SLASH AND BURN which causes most of CO2 and GHG emission

THE RECOMMENDATION is strongly associated with:

Sustainable Development Goals

 <p>TARGET 3.9</p>	<p>Reduce illnesses and death from hazardous chemicals and pollution</p> <p>By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.</p>	 <p>TARGET 11.6</p>	<p>Reduce the environmental impact of cities</p> <p>By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.</p>
 <p>TARGET 13.2</p>	<p>Integrate climate change measures into policies and planning</p> <p>Integrate climate change measures into national policies, strategies and planning.</p>		

ASEAN Economic Community Blueprint 2025

	<p>C.5. Food, Agriculture and Forestry</p> <p>iv. Increase resilience to climate change, natural disasters and other shocks</p>
------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------

ASEAN Socio-Cultural Community Blueprint 2025

<p>C.2. Environmentally Sustainable Cities</p> <p>iii. Promote coordination among relevant sectors to provide access to clean land, green public space, clean air, clean and safe water, and sanitation</p>	
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Thank you



**"Together We'll Analyze and Explore,
SAP Opens ASEAN's Door."**

-Team Titans, Thailand



ASEAN FOUNDATION



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DATA SCIENCE
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Appendix 1 : Partnership (AMAF)



ASEAN Ministers on Agriculture and Forestry
(AMAF), ASEAN foundation

The Vision of the ASEAN Cooperation in the agriculture and food sector is to create “A competitive, inclusive, resilient and sustainable Food, Agriculture, and Forestry (FAF) sector

Appendix 2 : Partnership (UN environment programme)



UNEP provides evidence-based data to inform policy decisions, collaborates with sectors for **low-carbon transitions**, provides climate finance mechanisms and aids countries in adaptation and mitigation efforts.

Appendix 3 : Partnership (World Health Organization)



WHO leads global efforts to expand **universal health coverage**.
We direct and coordinate the world's response to health emergencies.

Appendix 4 : Partnership (Clean Air Asia)



Clean Air Asia is an international non-governmental organization leading the regional mission for **better air quality**, and healthier, more livable cities throughout Asia.

Organization goals

Our mission is to reduce air pollution and greenhouse gas emissions in Asia and contribute to the development of a more sustainable.

Appendix 5 : (Case study) DroneUA by ukraine, Kiev

Feature

DJI Matrice 300 RTK aim for measuring the level of air pollution and verify whether air quality does indeed improve with altitude.

Censoring

Equipped with gas sensors

Duration

55-minute flight time

Planning, workflow, and results



automatic flight was set to go

WHY THE DJI MATRICE 300 RTK PROVED TO BE CRUCIAL IN MEASURING THE AIR QUALITY OF THE CITY OF KIEV

- Omni-directional Sensors**
These warned the pilot of impending dangers and prevent the drone from colliding with obstacles even at night.
- Payload Versatility**
Proved to be the most useful feature for it allowed frequent and seamless swapping between payloads.
- OcuSync Enterprise**
Provided high quality transmission to maintain control of the drone at all times.
- 55-minute Flight Time**
Uninterrupted flights and data collection with long stretches between battery swaps.
- 2.7 kg Lifting Capacity**
Enabled the team to mount the Sniffer4D V2 gas sensor (500g).
- Weather Proof IP45 Rating**
Although not required, this gave the team the confidence to operate due to the added layer of protection.