



Issue 6

September 30, 2023
(Revised March 10, 2024)

NEWSLETTER

Smart & Net-Zero Project



Overview

Welcome to the FFTC Smart & Net-Zero Newsletter! Explore innovative technologies, sustainable practices, policy initiatives, and knowledge sharing platforms worldwide.

In the Research section, you'll find valuable insights into low carbon farming, and the highlight is on the research team based in Kyoto University, who has compared cost-effectiveness of adopting different strategies and strategies. The News section contains press coverage of recent conferences where aquaculture is heralded as a low-carbon way of achieving food security, at the same time there is possibility of linking mangrove restoration with coastal fish farming practices by applying machine learning. The Policy section this month focuses on Southeast Asia, covering countries such as Thailand, Malaysia, Vietnam, and India. Open Data section this month showcases several software tools that support farm management.

Content	
Research	1
News	17
Policy	26
Open Data	32

<https://net.fftc.org.tw/smartnetzero>

www.fftc.org.tw



RESEARCH

01 THEME: Carbon sequestration; GHG emission reduction; Policy incentives, financing, pricing

How we can reduce the cost of fighting climate change

May 04, 2023 | npj Climate Action | [Source](#) |

A dedicated research team from the National Institute for Environmental Studies and Kyoto University in Japan conducted a study to uncover ways to make the fight against climate change more cost-effective. Their research focused on the complex world of climate policy and how different factors can influence the costs of reducing greenhouse gas emissions.

When we talk about climate change, one of the big challenges is the cost of taking action. Governments and organizations worldwide are working to reduce emissions, but it's not always clear how to do it without breaking the bank.

In this study, the researchers explored various scenarios using sophisticated computer models. These models help us understand what could happen in the future if we make certain changes to how we use energy and land. The goal was to figure out how to lower the cost of taking action against climate change.

Here's what they discovered:

- It's not just one thing that can make the difference. Instead, a combination of changes in our society and technology can help. For instance, we need to use less energy, adopt more eco-friendly ways of producing and consuming food, make advancements in clean energy technology, and encourage investments in sustainable projects.
- Importantly, the researchers found that there's no single solution to completely eliminate the costs of reducing emissions. We need a mix of approaches.
- Their study emphasized the need for changes across different sectors of our society. It's not just about energy or food; it's about how all these parts work together. Effective government policies and adapting to unpredictable social and technological changes are crucial.

In essence, this study provides valuable insights into how we can make it more affordable to address climate change. It highlights that it's not just one simple fix but a combination of efforts across various areas of our society. This collective action is vital to combat climate change effectively while ensuring a sustainable and prosperous future for our planet.

[Read more:](#) Climate change mitigation costs reduction caused by socioeconomic-technological transitions

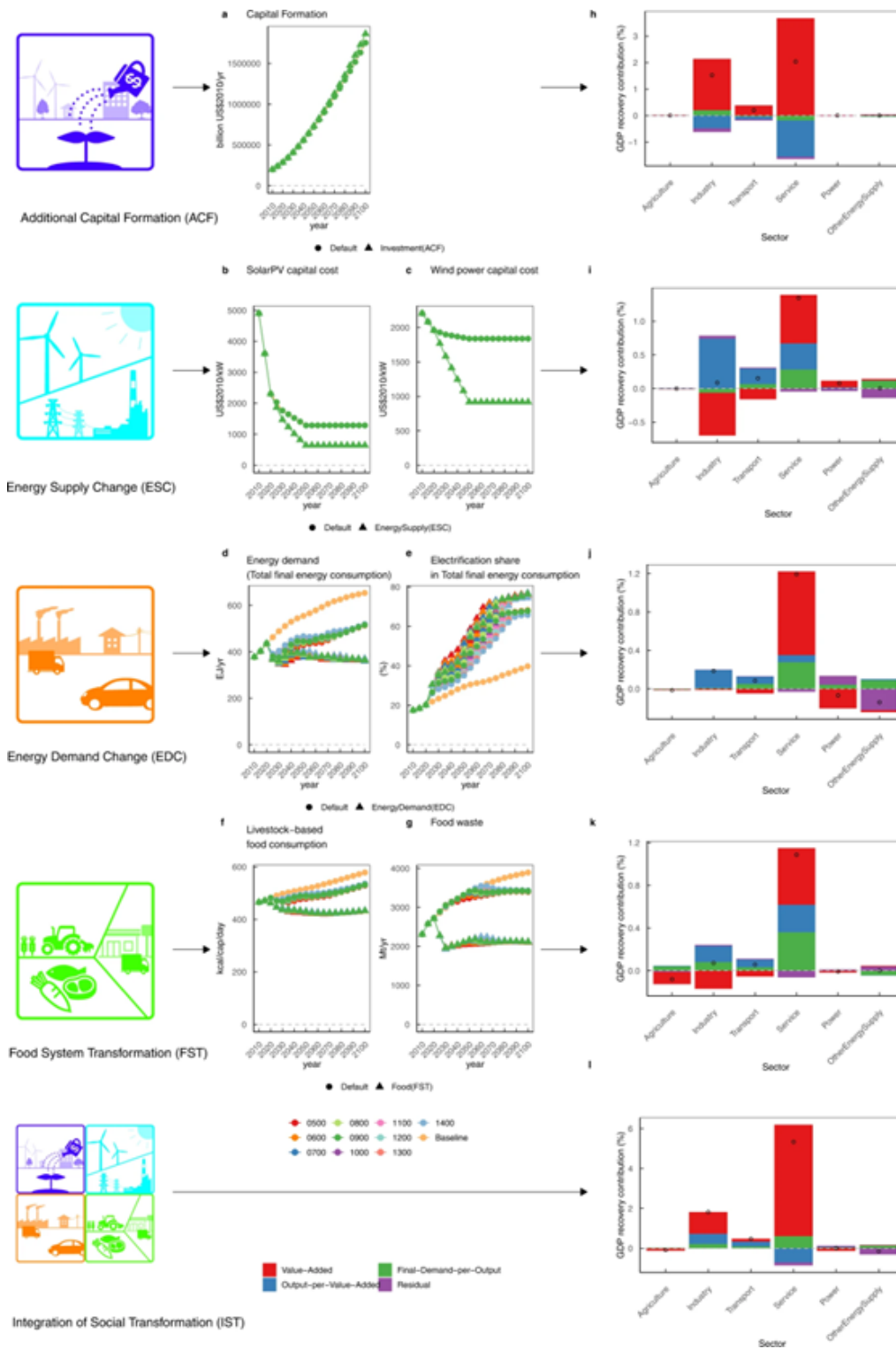


Figure | Mechanism of GDP loss reduction associated with socioeconomic-technological transition and decomposition analysis of GDP loss reduction from the default to socioeconomic-technological transition scenarios under a 1000-Gt CO₂ budget for 2100. | Global capital stock, capital cost of solar photovoltaic (PV) and wind turbine technologies, final energy consumption and electrification rates, livestock-based food consumption and food waste generation under various socioeconomic-technological transition scenarios with a 1000-Gt CO₂ budget (a, b, c, d, e, f, g, respectively). h, i, j, k, l Shows decomposition analyses of GDP loss reduction by sector. The black circles indicate the total net impacts on GDP loss reduction by sector. All values are expressed in terms of % of overall GDP with different y-axis ranges.

02 THEME: Others

The Fragile Future of Our Global 'Blue' Food Supply

June 26, 2023 | Nature Sustainability | [Source](#) |

A diverse team of researchers from China, Sweden, the USA, Canada, and Chile embarked on a vital study focusing on the vulnerability of an often-overlooked resource: 'blue' foods, which include aquatic delicacies like fish and seafood. These foods are essential for more than 3.2 billion people worldwide, yet they face significant challenges in maintaining their supply amidst a changing environment while also meeting safety and sustainability standards.

In today's world, where human activities are profoundly impacting the planet, it's critical to understand how these changes affect the production of blue foods. Surprisingly, until now, not enough attention has been given to this important issue.

Here's what the researchers discovered:

- When we convert natural environments into fields for growing crops, we often end up losing a substantial portion of our blue food supply. The good news is that smart farming practices, like planting trees or using special carbon-rich materials, can help us recover some of these losses.
- In forests, the way we manage them can sometimes lead to a decrease in blue food production.
- What's interesting is that the indirect effects of climate change, such as wildfires, have a more significant impact on blue food production than the direct effects of rising temperatures.

This study reveals some sobering facts: more than 90% of global blue food production is at significant risk due to environmental changes. The countries that produce the most blue foods, like those in Asia and the United States, face the greatest threats.

Different types of blue food production are affected in various ways. For example, capturing fish from the ocean is often riskier than farming fish in freshwater environments. And some countries have more concerns about the safety of the food they produce than others.

The study also emphasizes the importance of helping developing countries in regions like Asia, Latin America, and Africa. In these areas, the risks are high, and the resources to respond to these challenges are limited. By understanding these risks better, we can create plans to protect our blue food supply and make sure it remains both safe and sustainable as our world changes.

In a nutshell, this study highlights the vulnerability of our 'blue' food supply in a world that's rapidly changing. It urges us to take action to safeguard this vital resource and ensure that it continues to feed billions of people while respecting our environment's health and sustainability.

[Read more](#): Vulnerability of blue foods to human-induced environmental change

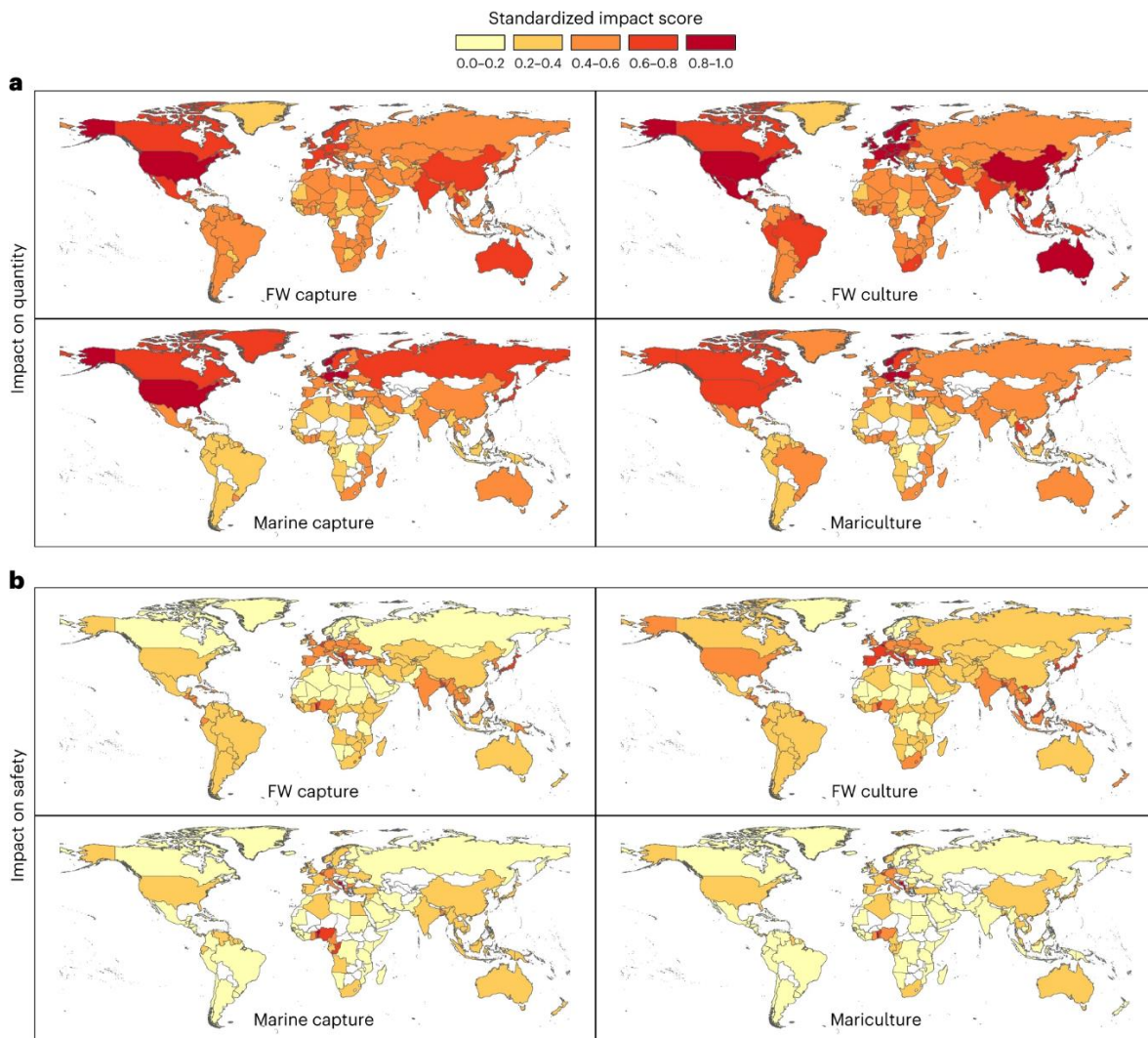


Figure | Estimated impacts of anthropogenic stresses on global blue food production. | a, Impacts on quantity. b, Impacts on safety. Results were standardized and presented at the national level for each blue food production system. The four production systems included freshwater capture fisheries, freshwater aquaculture, marine capture fisheries and mariculture.

03 THEME: Carbon sequestration, GHG emission reduction

Unearthing the impact of human activities on soil organic carbon in the modern era

June 29, 2023 | Nature Communications | [Source](#) |

Researchers from CIRAD in France conducted a comprehensive study examining the effects of human activities on soil organic carbon (SOC), a crucial component of the Earth's ecosystems with profound implications for climate regulation. In the Anthropocene, an era characterized by significant human influence on the environment, understanding how SOC is influenced by factors such as land use, land management, and climate change is of paramount importance.

To gain deeper insights, the researchers performed a meticulous review, encompassing an impressive 230 first-order meta-analyses that collectively analyzed over 25,000 primary studies. Their second-order meta-analysis synthesized these findings, revealing several critical observations:

- Conversion of natural landscapes into crop fields often results in substantial losses of SOC. However, hope lies in effective land management practices, especially the integration of trees and the incorporation of exogenous carbon sources like biochar or organic amendments, which can partially restore SOC levels.
- In the context of forested environments, certain land management practices may lead to SOC depletion, underscoring the need for careful management strategies to maintain carbon stocks in these ecosystems.
- Surprisingly, indirect effects of climate change, such as those mediated through events like wildfires, have a more pronounced impact on SOC than the direct consequences of rising temperatures.

The findings of this study offer robust evidence to guide decision-makers in preserving SOC reservoirs and promoting land management practices aimed at SOC restoration. Additionally, this research serves as an invaluable roadmap for future investigations, pinpointing specific areas in need of further exploration to bridge existing knowledge gaps regarding the drivers of SOC dynamics. In essence, it provides a scientifically grounded blueprint for safeguarding an often-overlooked but critical component of our planet's environmental stability.

[Read more](#): A global meta-analysis of soil organic carbon in the Anthropocene

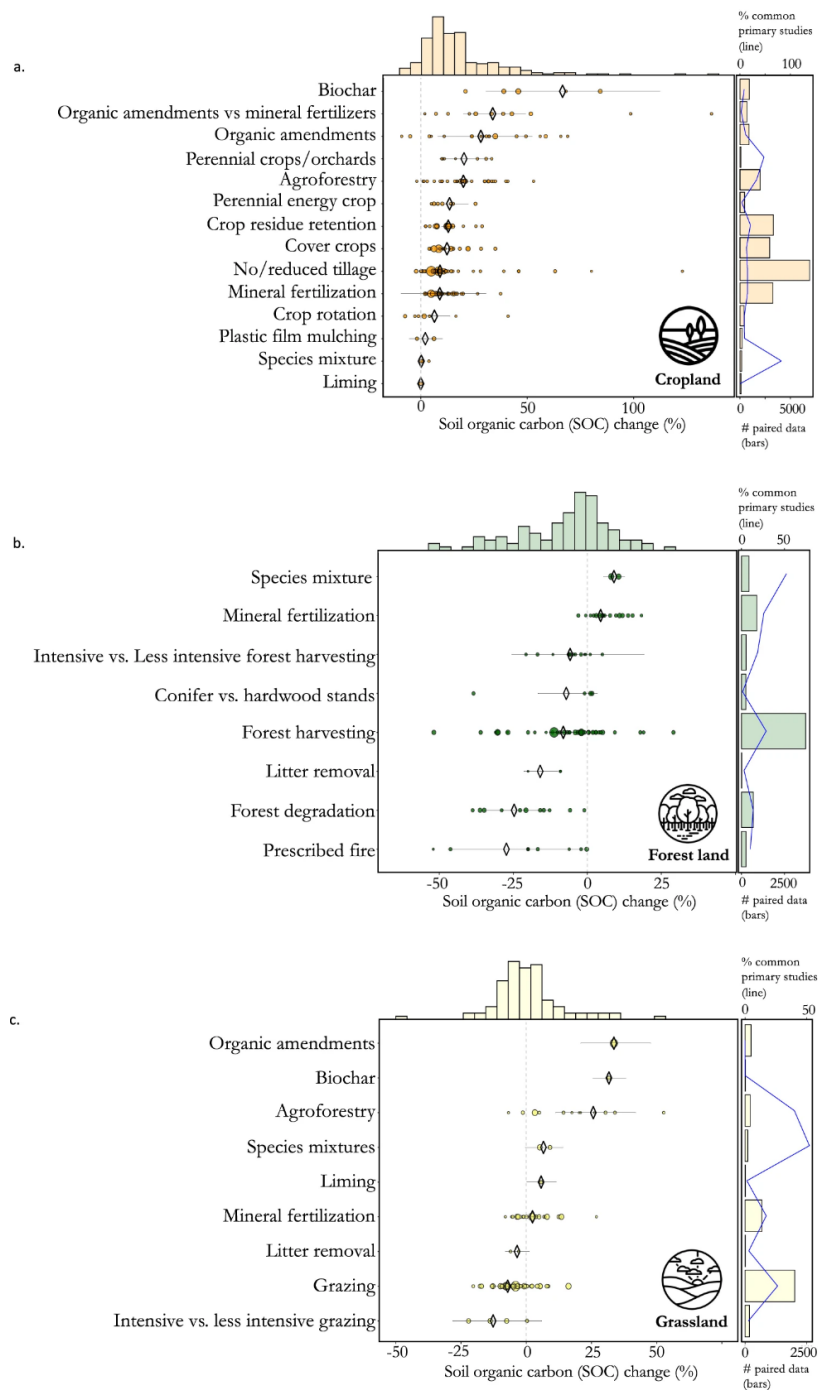


Figure | Percentage change in soil organic carbon (SOC) due to land management practices | Results are detailed for croplands (a) forest lands (b) and grasslands (c) Diamonds and lines of the main plots represent the mean effect sizes and 95% confidence intervals (CIs), respectively. The dot sizes are proportional to the number of paired data analyzed. The histograms above each plot represent the probability distribution of effects for all practices combined. The bar plots on the right side of each main plot represent the number of primary studies for each practice (bars) and the percentage of primary studies used by at least two meta-analyses (lines). Forest degradation includes the transformation of primary forest to secondary forest and secondary forest to plantation forest.

04 THEME: Others

Unpredictable heat and drought threats to wheat crops in the USA and China

June 02, 2023 | npj Climate and Atmospheric Science | [Source](#) |

A dedicated team of researchers from Tufts University, Zimbabwe Meteorological Services Department, and Climate Adaptation Services (CAS) in the Netherlands conducted a study that focuses on the unexpected challenges facing wheat crops in important regions of the USA and China.

When it comes to assessing the risk of crop failures, many past studies have relied on historical patterns of climate and crop yields. However, our world is changing due to climate change, and this is leading to entirely new and unpredictable events. These events have the potential to harm our food supply even if they've never occurred before in history. This means that we might not fully understand the risks climate change poses to our food.

In this study, the researchers used a unique approach called "UNprecedented Simulated Extreme ENsemble" (UNSEEN). This method creates thousands of possible extreme climate events that have never happened before and may challenge our crops. They compared these simulated events with the extreme temperatures and rainfall patterns we've seen historically.

What they found is concerning:

- In regions like the US Midwest and China, extreme temperatures that used to be very rare have become much more common. In some cases, the chance of these extreme temperatures happening in any given year has increased dramatically.
- These record-breaking hot years often bring extremely dry conditions, which are harmful to wheat plants.
- The study also showed that strong winds can bring dry air to these regions during extremely hot and dry events, worsening the situation.

In essence, this research highlights the growing unpredictability and increased risk of heatwaves and droughts in wheat-producing regions. These events can seriously harm our food supply. It also emphasizes that relying solely on historical data to understand these risks might not be enough. As our climate continues to change, we need to adapt and prepare for unforeseen challenges in our agriculture, so we can safeguard our food for the future.

[Read more](#): Potential for surprising heat and drought events in wheat-producing regions of USA and China

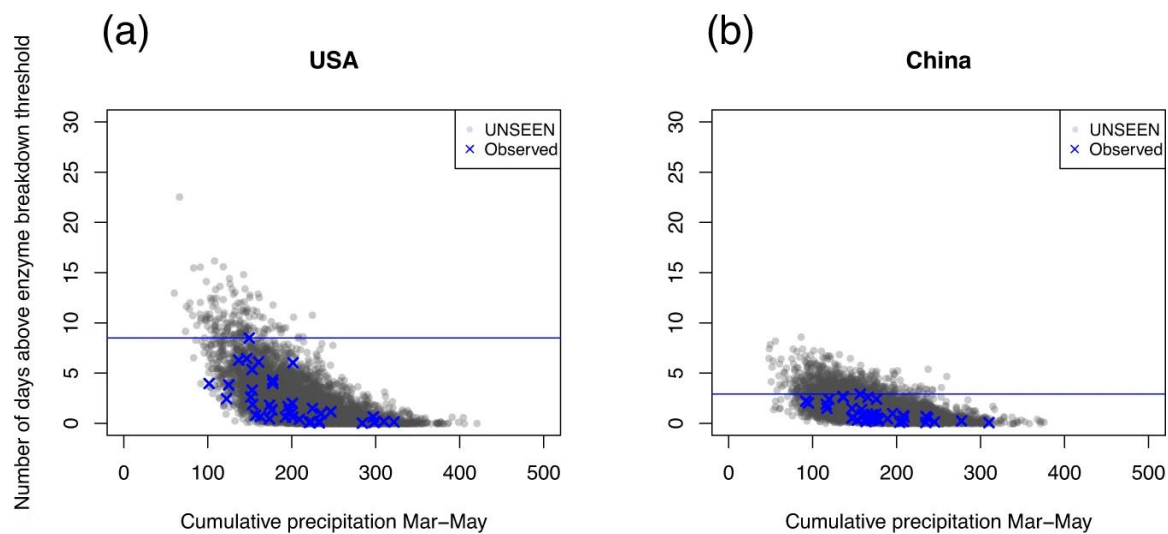


Figure | Extreme heat vs extreme dryness | Cumulative precipitation plotted against the number of days crossing the “enzyme breakdown” threshold in March–May for (a) USA and (b) China. UNSEEN ensemble members are plotted in gray, overlaid with observations in blue. The historical record for number of “enzyme breakdown” days is plotted as a blue horizontal line; any gray UNSEEN events above that line are record-breaking.

05 THEME: GHG emission reduction

Tackling global food and fertilizer challenges with smart nitrogen use

June 29, 2023 | Nature Sustainability | [Source](#) |

A collaborative research effort involving CIMMY, AfricaRice, and USAID has brought attention to a critical issue in the world of food and agriculture.

Imagine a scenario where there's a regional conflict and sudden disruptions in the supply of a vital ingredient for both fuel and fertilizer production. This situation highlights the vulnerabilities in the complex web that connects fuel, fertilizers, and food. Specifically, it shines a spotlight on the rising prices of nitrogen-based fertilizers, which have the potential to threaten our global food security.

To address this challenge, the researchers propose a targeted and differentiated approach to nitrogen fertilizer use in agriculture. Here's what they found:

- By carefully managing both organic and inorganic sources of nitrogen in cereal production systems, significant nitrogen fertilizer savings can be achieved. For example, India could potentially save 11% of its nitrogen fertilizer use, while Ethiopia and Malawi could save up to 49% and 44%, respectively.
- Shifting to more efficient and cost-effective nitrogen fertilizers, like urea, and combining them with organic sources like compost and legume crops can help optimize nitrogen use in areas that lack sufficient nitrogen.
- It's essential to tailor nitrogen fertilization strategies to specific regions. High-nitrogen fertilizers should be prioritized in places where yields are low due to nitrogen deficiency. In contrast, regions with surplus nitrogen should aim for balanced fertilization of nitrogen, phosphorus, potassium, and micronutrients.

- Governments can play a significant role by investing in agricultural extension services and revising subsidies to encourage farmers to improve their nitrogen management practices.

In essence, this research highlights the importance of efficient nitrogen use in agriculture to address challenges related to food and fertilizer prices. By taking a more precise and location-specific approach, we can save resources, boost crop yields, and ensure a stable food supply, even in the face of global uncertainties.

[Read more](#): Spatially differentiated nitrogen supply is key in a global food–fertilizer price crisis

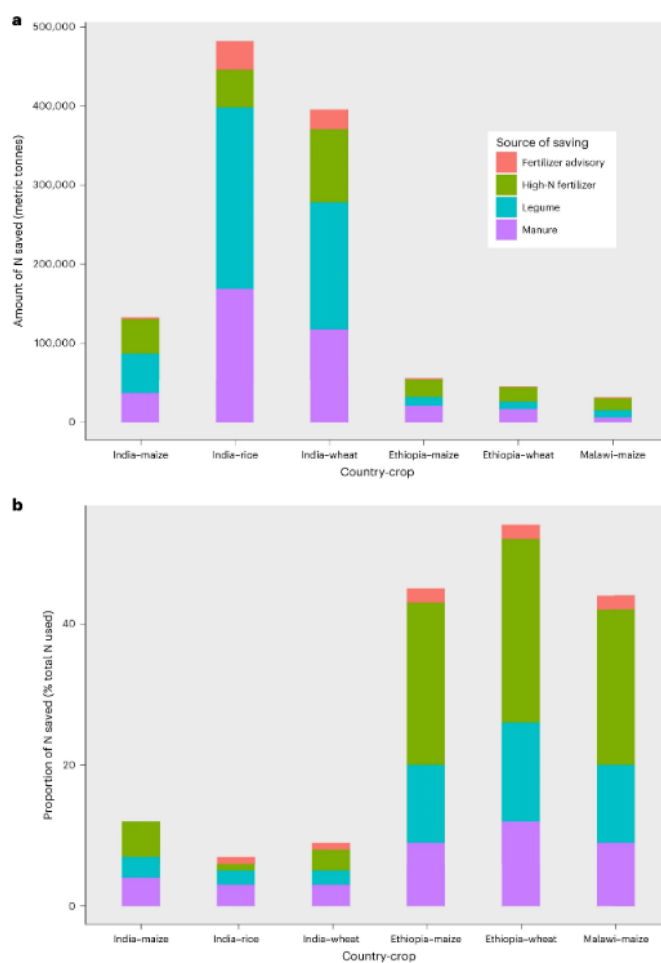


Figure | Projected N-fertilizer savings from near-term interventions. | a, Estimated total N fertilizer saved in cereal production systems in India, Ethiopia and Malawi through: (1) promotion of manure use (including compost) and legume production; (2) subsidized access to increased use of high-N fertilizer types; and (3) advisories for improved fertilizer use efficiency. b, Proportion of N fertilizer saved relative to N fertilizer used in cereal production in India, Ethiopia and Malawi.

06 THEME: GHG emission reduction

Reducing greenhouse gas emissions from livestock manure composting

August 10, 2023 | Science of The Total Environment | [Source](#) |

Researchers from China Agricultural University have delved into a critical aspect of farming and environmental conservation: composting manure from livestock. Here's what they found:

Manure composting isn't just about managing waste; it also plays a significant role in combating climate change. To better understand this process, the researchers conducted a comprehensive analysis, looking at data from 87 published studies in 11 different countries, totaling 371 observations.

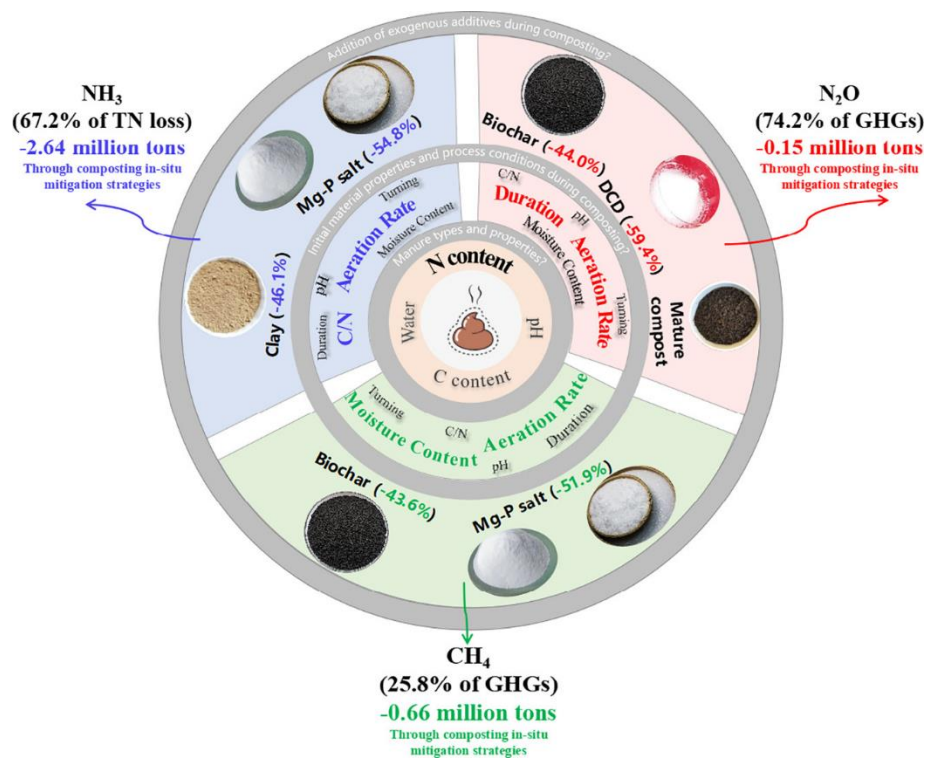
Here are some key takeaways:

- **Nitrogen Matters:** The nitrogen content in animal feces has a big impact on the release of greenhouse gases (GHGs) and nutrient losses during composting. When nitrogen levels are high, there's an increase in emissions of ammonia (NH₃), carbon dioxide (CO₂), and methane (CH₄).
- **Composting Methods:** The way we compost matters too. Windrow pile composting, especially when compared to trough composting, is more environmentally friendly, leading to lower GHG emissions and nutrient losses.
- **Control Factors:** Factors like the carbon-to-nitrogen (C/N) ratio, aeration rate, and pH value influence NH₃ emissions. Adjusting these factors can reduce NH₃ emissions significantly. Lowering moisture levels and increasing the frequency of turning the compost can also help reduce CH₄ emissions.
- **Enhancing Mitigation:** Adding substances like biochar or superphosphate to the compost can be beneficial. Biochar is excellent at reducing N₂O and CH₄ emissions, while superphosphate is effective in reducing NH₃ emissions when added in the right proportion.
- **Chemical Additives:** Dicyandiamide stands out as a chemical additive that can substantially reduce N₂O emissions during composting.
- **Microbial Agents:** Using certain types of microbial agents during composting can help decrease NH₃-N emissions, and mature compost itself can also help reduce N₂O-N emissions.

Overall, the research underscores the importance of responsible manure management to combat climate change. By optimizing composting techniques and using the right additives, we can significantly reduce greenhouse gas emissions from this essential agricultural process and contribute to a more sustainable future.

[Read more:](#) A global meta-analysis of greenhouse gas emissions and carbon and nitrogen losses during livestock manure composting: Influencing factors and mitigation strategies

Graphical abstract



07 THEME: Carbon sequestration

Unveiling the Carbon Flow in Midwest Farms

July 20, 2023 | Science of The Total Environment | [Source](#) |

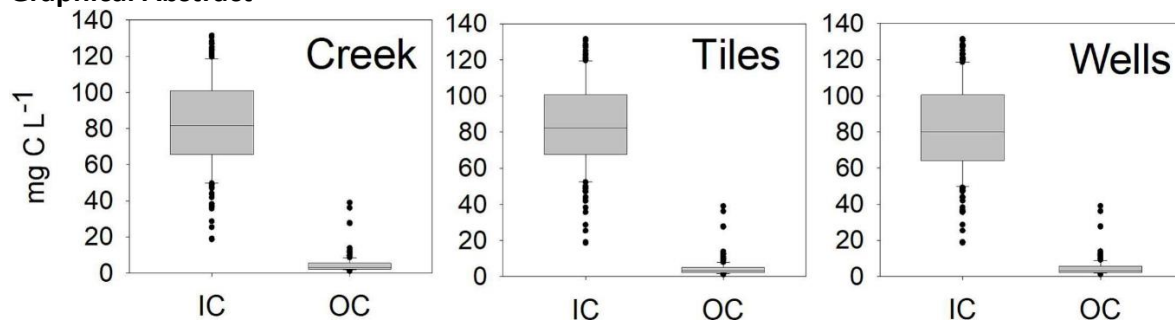
Researchers from the University of Iowa and Grinnell College set out to investigate an essential but often overlooked aspect of agriculture: how carbon moves through fields that are artificially drained for farming. The researchers closely monitored a single cropped field in north-central Iowa during the March to November period in 2018. They focused on eight tile outlets (where excess water drains), nine groundwater wells, and the nearby stream. Their goal was to understand how inorganic carbon (IC) and organic carbon (OC) flowed from the soil to the stream. Here's what they found:

- **Carbon Dominance:** Most of the carbon that flowed out of the field was in the form of inorganic carbon (IC). In fact, IC losses through subsurface drainage tiles were a whopping 20 times higher than the concentration of dissolved OC in the tiles, groundwater, and the nearby Hardin Creek.
- **Subsurface Drainage:** The drainage tiles, which are used to remove excess water from fields, were responsible for approximately 96% of the total carbon exported from the field.
- **Carbon Stock:** The researchers also dug deep into the soil, going down 1.2 meters, and found that there was a substantial amount of total carbon (TC) stored in the shallow soils. They estimated that only a small percentage of this carbon (0.23%) was lost in a single year through the drainage system.

- **Mitigation Factors:** It's likely that some of this carbon loss is balanced out by reduced tillage practices and the addition of lime to the soil.

[Read more:](#) Dissolved inorganic and organic carbon export from tile-drained midwestern agricultural systems

Graphical Abstract



08 THEME: GHG emission reduction

Harnessing Solar Power to Revolutionize Greenhouse Farming

September 1, 2023 | Journal of Cleaner Production | [Source](#) |

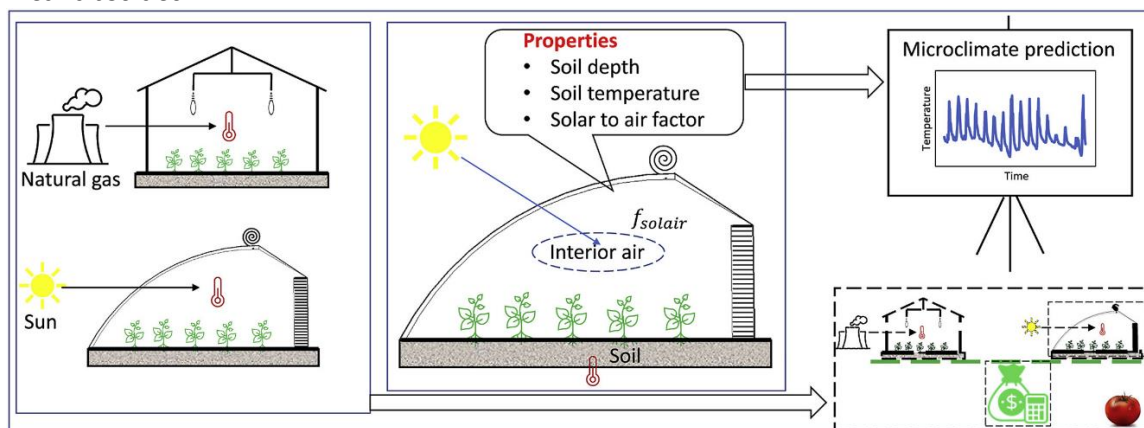
Researchers from the University of Windsor in Canada have explored a groundbreaking approach to agricultural greenhouses, ones that could change the way we grow crops, save energy, and reduce our carbon footprint. Agricultural greenhouses are like a protective shield for crops, creating a perfect environment for them to grow, even in extreme weather conditions. However, the cost of running these greenhouses can be high because they need a lot of energy to keep the right conditions for crops. To make agriculture more sustainable and environmentally friendly, the researchers focused on designing a special type of greenhouse called a "net-zero passive solar greenhouse." This greenhouse is located in Alberta, Canada, where winter temperatures can drop below freezing. Here's what they did:

- **Innovative Modelling:** The researchers used advanced computer models to simulate what happens inside this unique greenhouse. They wanted to see how it would perform and what kind of environment it could create for the crops.
- **The Power of the Sun:** Unlike traditional greenhouses that rely on energy from power plants, this net-zero greenhouse taps into clean, renewable solar energy. It uses the sun's warmth to create the right conditions for crops to thrive.
- **Digging into the Details:** The study looked at various factors, including the type of ground the greenhouse was built on and how much of the sun's energy was used to warm the air inside.
- **Cost Savings:** Importantly, the research also compared the cost of growing crops in this special greenhouse to the cost in a traditional one.

By harnessing the power of the sun and making the most of natural resources, these net-zero greenhouses not only benefits farmers but also the environment, as it reduces the greenhouse gases produced by traditional farming methods.

[Read more](#): Thermal modelling of a passive style net-zero greenhouse in Alberta: The effect of ground parameters and the solar to air fraction.

Graphical abstract



09 THEME: GHG emission reduction

Unveiling Methane Emissions from Our Rivers and Streams

August 16, 2023 | Nature | [Source](#) |

A collaborative team of researchers from Sweden, the USA, Canada, and China has set out to investigate a critical environmental issue: the release of methane, a potent greenhouse gas, from rivers and streams across the globe.

Methane (CH₄) is a powerful contributor to global warming, and its levels in the atmosphere have surged threefold since the industrial revolution. We know that global warming has increased methane emissions from freshwater ecosystems, which, in turn, exacerbate climate change. However, when it comes to understanding the extent and causes of methane emissions from rivers and streams, there have been significant uncertainties.

Here's what the researchers discovered:

- **Global Emissions:** They estimated that rivers and streams release a substantial amount of methane, about 27.9 (with a range from 16.7 to 39.7) teragrams of methane per year. This amount is roughly equivalent to the methane emissions from other freshwater systems.
- **Temperature Influence:** Surprisingly, the researchers found that riverine methane emissions are not highly dependent on temperature. Unlike lakes and wetlands, where temperature plays a significant role in methane emissions, rivers and streams show a weaker connection to temperature variations.
- **Global Patterns:** The study revealed that there are large methane emissions in both high-latitude (closer to the poles) and low-latitude (closer to the equator) regions, as well as in

areas heavily influenced by human activities. These patterns are explained by specific soil and climate characteristics linked to the presence of low-oxygen conditions in or near river habitats. These conditions are influenced by factors like the availability of organic matter and the saturation of soils connected to the water.

In essence, this research highlights the crucial role that land-water connections play in regulating methane emissions from rivers and streams. These emissions are not only vulnerable to direct human impacts but are also affected by climate change responses on land. Understanding and managing these emissions is vital in our ongoing efforts to address climate change and protect our planet's ecosystems.

[Read more](#): Global methane emissions from rivers and streams

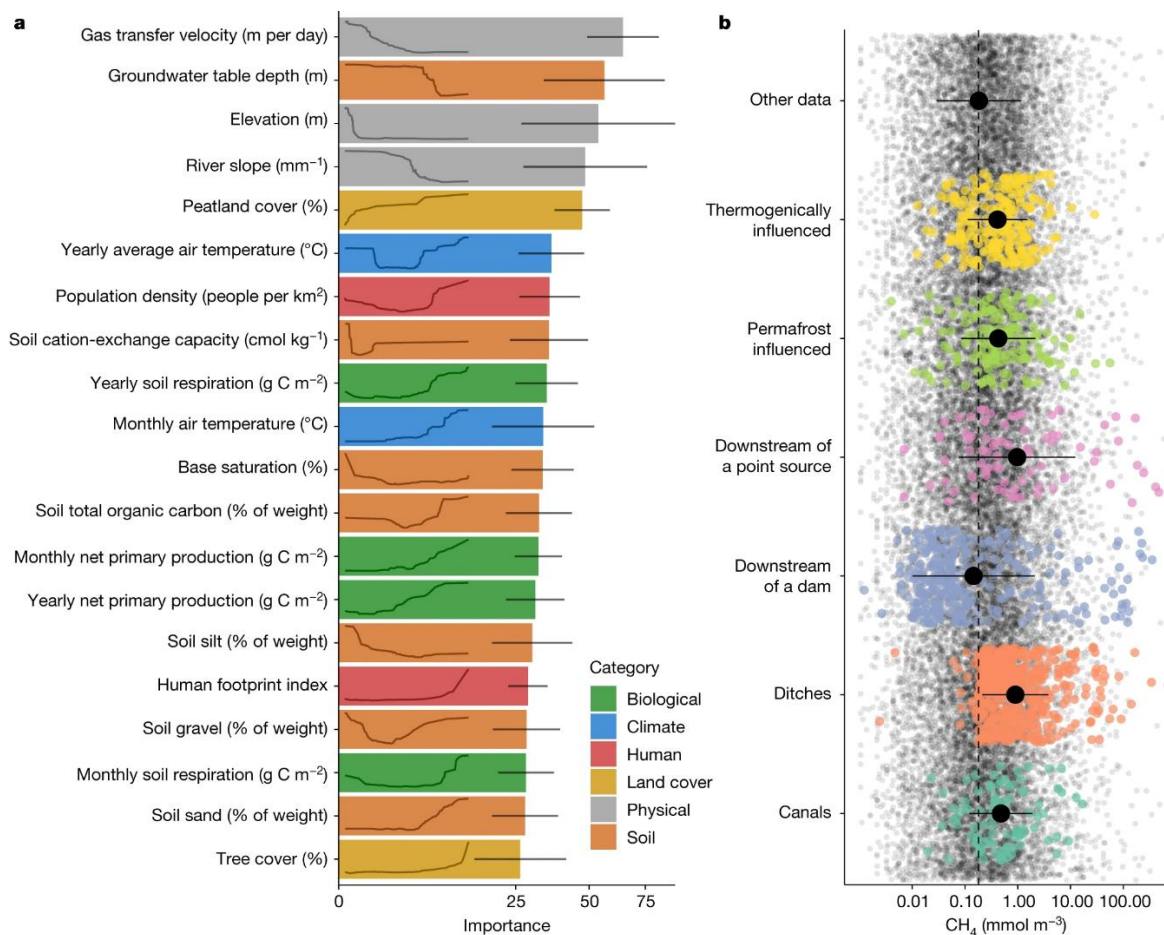


Figure | Main drivers of CH₄ concentrations in streams. | a, The 20 most important variables in the random forest model. The x axis shows the median importance across all monthly models (n = 12), with error lines representing standard deviation (s.d.); note the square-root transformation of the x axis. The line inside each bar is the partial dependence, which represents the marginal effect of a given feature (x axis) on predicted CH₄ concentrations (y axis). These lines are a simplification of a more detailed version (Supplementary Information). b, CH₄ concentrations of some site categories from GRiMeDB13 were excluded from the model as they were not captured in the hydrological model or were targeted observations not representative of catchment properties (Methods). The underlying jittered points represent all other observations in GRiMeDB, with the dashed line representing the average. Each category is colour-coded, with the black dot and a line representing the mean ± s.d.

09 THEME: Carbon sequestration

Using Satellite Data to Track Carbon Changes in Tropical Asia

August 1, 2023 | Remote Sensing of Environment | [Source](#) |

A collaborative research effort involving experts from China, France, the UK, and Denmark has delved into the intriguing changes happening in tropical Asia's lush landscapes. Specifically, they've been studying how carbon, an essential element in all living things, is shifting in this region.

Tropical Asia has been getting greener in recent years, but we haven't had a clear understanding of how this growth affects the carbon stored in plants. To solve this puzzle, the researchers turned to satellite technology. They used data from satellites equipped with both optical and microwave sensors to monitor the region's aboveground live biomass carbon (AGC) from 2013 to 2019.

Here's what they discovered:

- **Effective Proxies:** They found that certain satellite-based measurements, like LAI (Leaf Area Index), percent tree cover (PTC), and L-VOD (Vegetation Optical Depth measured in L-band), were closely connected to the distribution of carbon in plants. In other words, when these measurements increased, it often meant more carbon was stored in the vegetation.
- **Satellite Advantages:** Satellite technology, especially in X- and C-bands, was particularly good at capturing changes in carbon storage for areas with medium carbon density vegetation. However, it struggled to track carbon changes in places with high carbon density vegetation.
- **Carbon Trends:** Using L-VOD data, the researchers estimated that tropical Asia's forests and non-forest areas collectively stored more carbon in plants each year, at a rate of roughly 44 to 53 teragrams of carbon. The majority of this increase occurred in non-forest regions.
- **Change Drivers:** The study revealed some important trends. Non-forest areas in parts of India, China, and Vietnam experienced consistent carbon storage growth, while forests in Laos, Malaysia, and Indonesia lost carbon due to deforestation.

In essence, this research helps us understand how tropical Asia is managing its carbon resources. It shows that some regions are storing more carbon in plants, mainly outside of forests, while others are losing carbon due to deforestation. By using advanced satellite technology, we can track these changes and work toward more sustainable land use practices to protect our planet's vital carbon balance.

[Read more:](#) First assessment of optical and microwave remotely sensed vegetation proxies in monitoring aboveground carbon in tropical Asia

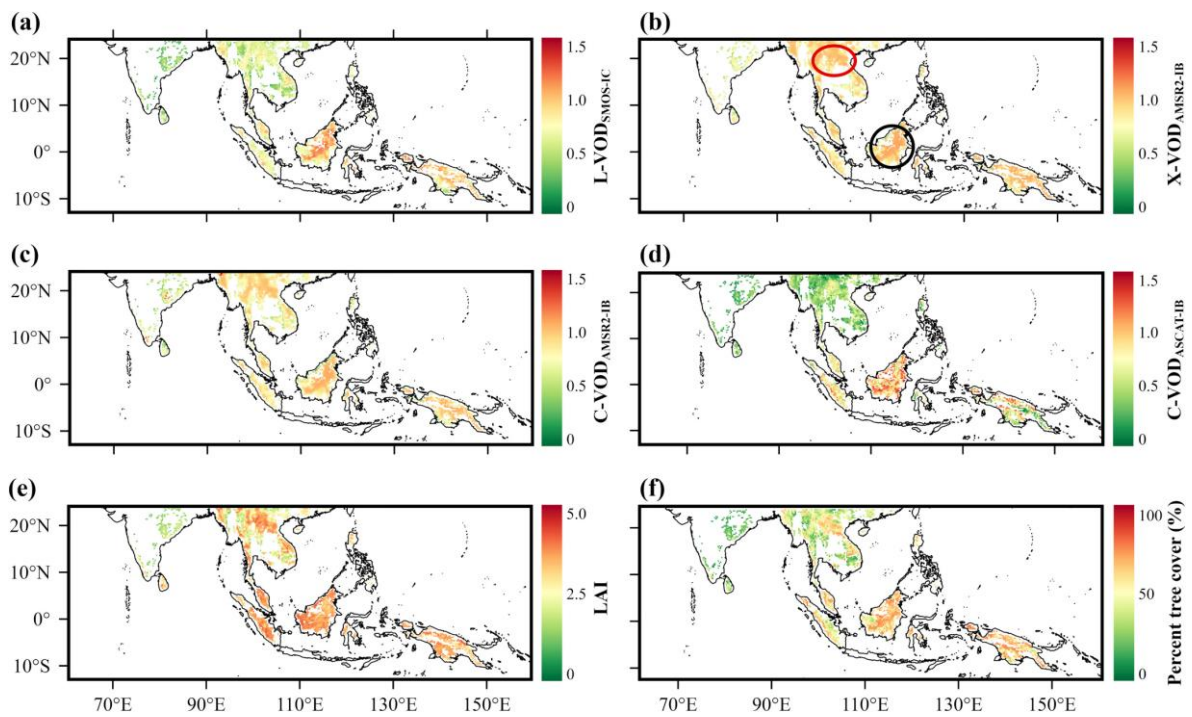


Figure | Spatial patterns of the six AGC proxies over tropical Asia | (a) L-VODSMOS-IC; (b) X-VODAMSR2-IB; (c) C-VODAMSR2-IB; (d) C-VODASCAT-IB; (e) LAI; (f) percent tree cover.

NEWS

01 THEME: Carbon sequestration, GHG emission reduction, Policy incentives, financing, pricing

Nature-Based Carbon Offsets Crucial in the Road to Net Zero

August 18, 2023 | Carbon Credits | [Source](#) |

Carbon offsets, particularly nature-based ones, are a crucial tool on the path to achieving net-zero emissions. They help neutralize emissions and combat climate change by investing in projects that remove or reduce carbon dioxide from the atmosphere. While some skepticism exists due to a few problematic projects, dismissing all carbon offset initiatives as "greenwashing" is counterproductive.

Achieving net-zero emissions is essential to address the escalating climate crisis. This goal involves balancing greenhouse gas emissions with equivalent removals. Carbon offsets play a vital role in this process by enhancing natural systems, like forests and farmlands, to absorb more carbon dioxide than they release.

One notable initiative is REDD+ (Reducing emissions from deforestation and forest degradation in developing countries), which has reported a reduction of almost 10 billion tons of carbon dioxide across 13 developing countries. Additionally, sustainable agricultural practices, such as agroforestry and no-till farming, enhance soil health while capturing carbon.

Agroforestry integrates trees into farmland, boosting carbon sequestration, improving soil fertility, conserving water, and diversifying farmers' income streams. No-till farming involves growing crops without disturbing the soil, reducing soil erosion, improving soil health, and capturing carbon.

The voluntary carbon offset market is growing rapidly, with the global carbon credit market reaching over \$850 billion in 2021. Nature-based carbon offsets, valued at \$0.6 billion in 2020, are expected to gain popularity in the voluntary market.

However, robust regulations are essential to ensure the integrity of the carbon offset sector. Establishing norms for governance, independent verification, and market standards is crucial, along with addressing issues like additionality, leakage, and permanence.

Critiques of nature-based carbon offsetting provide an opportunity for the market to evolve and improve transparency. Buyers are increasingly seeking reputable monitoring, reporting, and verification frameworks, prioritizing high-quality, or "high-integrity," credits to avoid greenwashing accusations.

While challenges exist, the carbon industry has the potential to significantly contribute to combating climate change. Stakeholders must demonstrate a responsible and ethical approach to carbon offsetting, emphasizing proven approaches and substantial net negative emissions at scale.

02 THEME: GHG emission reduction

UN Stocktaking Moment stresses aquatic food systems for sustainable solutions

August 14, 2023 | WorldFish | [Source](#) |

Aquatic food systems hold great potential as a sustainable solution to address global food and nutrition security amid the challenges posed by climate change. A recent UN event, "Blue Transformation – advancing aquatic food systems for people, planet and prosperity," emphasized the importance of harnessing the potential of aquatic food systems, such as fish and aquaculture, to combat hunger, poverty, and the impact of climate change.

The event highlighted that over 3 billion people rely on aquatic food systems for at least 20 percent of their animal protein, and these systems provide livelihoods for approximately 600 million people. Aquatic food production is at a record high and is expected to grow by 11 percent by 2030, offering promise in feeding a growing global population.

Maria Helena Semedo, Deputy Director-General of the Food and Agriculture Organization of the United Nations (FAO), stressed the role of fish and aquaculture in fighting hunger and poverty, especially as the number of hungry people has increased by 122 million since the pandemic.

To fully realize the potential of aquatic food systems, international cooperation, research, and knowledge-based management are essential. Anne Beathe Tvinnereim, the Norwegian Minister for International Development, emphasized the importance of data on food safety and nutrients to inform food and nutrition policies.

The transformative impacts of sustainable aquatic food production were highlighted in WorldFish's 2022 Annual Report, which showcased success stories from communities around the world. For example, brine shrimp farming in Bangladesh has significantly increased salt farmer incomes, while community-based resource management in the Solomon Islands supports sustainable local economies and environments.

WorldFish is launching the Asia–Africa BlueTech Superhighway (AABS) project to further harness the potential of aquatic food systems in Asia and Africa, aiming to transform food and nutrition security and livelihoods for millions.

Aquatic food systems offer a promising path to address food security challenges while considering the environment and climate resilience.

03 THEME: Carbon sequestration, ICT in agrifood sustainability, Policy incentives, financing, pricing

Using machine learning to integrate mangrove restoration with sustainable aquaculture intensification

July 31, 2023 | The Fish Site | [Source](#) |

A team of experts in academia, conservation, and technology has developed an AI-powered rapid assessment tool to identify and validate suitable sites for Climate Smart Shrimp (CSS) production in Indonesia and the Philippines. The initiative, funded by the 2022 Climate Change

AI Innovation Grants program, aims to address the rapid growth of shrimp aquaculture, which has led to the destruction of critical coastal ecosystems like mangroves.

The Climate Smart Shrimp program, developed by Conservation International, supports small- and medium-sized farmers in intensifying production on part of their farms sustainably in exchange for mangrove restoration on the remaining portion. This approach enhances farmers' competitiveness while restoring vital coastal ecosystems.

The team used machine learning and earth observation data, including Planet NICFI satellite imagery and aquaculture pond data, to identify and classify aquaculture farms using extensive production methods. They combined this information with data on sea level rise, flood risk, infrastructure access, historical mangrove cover, and other factors to identify suitable sites for CSS. The result is an interactive web-map tool that analyzes potential aquaculture site suitability based on specific criteria.

This tool not only accelerates the identification of suitable CSS sites but also aids conservation practitioners in decision-making for nature-based solutions. It streamlines the implementation of CSS while supporting efforts to restore mangroves and enhance food security and livelihoods. The tool can potentially be adapted for various coastal and terrestrial restoration applications.

The development of this site assessment tool contributes to the efficient implementation of CSS, which supports both sustainable shrimp aquaculture and climate resilience in coastal communities. CSS is being piloted not only in Southeast Asia but also in Ecuador, demonstrating its applicability across different production systems and geographies.

04 THEME: GHG emission reduction

Australian red meat industry stakes a claim for a carbon neutral future

August 9, 2023 | Earth.Org | [Source](#) |

The Australian red meat industry, led by Meat & Livestock Australia (MLA), is aiming to achieve carbon neutrality by 2030 while doubling the value of Australian red meat sales within the same timeframe. Despite the ambitious nature of these twin goals, recent analysis by CSIRO indicates that the industry is already on the right path, with greenhouse gas emissions from the Australian red meat sector falling by 59% since 2005. This reduction has contributed to a drop in the sector's share of national emissions from 22% to 10.7% between 2005 and 2019.

The majority of emissions from the red meat sector come from cattle, primarily due to enteric methane emissions from their digestive processes. To tackle this challenge, the industry is implementing a range of strategies, including reducing land clearing, sequestering carbon through tree planting, improving soil management, optimizing herd management for efficiency, and enhancing feeding and grazing practices to reduce methane emissions.

To achieve carbon neutrality, MLA is collaborating with CSIRO to develop a digital assurance system that will provide producers with access to premium markets and prices based on their carbon-neutral credentials. This initiative aims to support the entire industry in adopting sustainable practices. Additionally, research is ongoing into feed supplements that can reduce

methane emissions in feedlot herds, such as FutureFeed, which utilizes red algae to lower methane emissions by up to 80%.

The challenge of achieving carbon neutrality extends to grazing livestock, and research is being conducted into the emissions-reduction benefits of legume fodder crops and native shrubs. Genetics is also playing a role in breeding animals that produce less methane and grow more efficiently.

Moreover, MLA and CSIRO are working on establishing standards and verification mechanisms to ensure that carbon-neutral claims are trustworthy and verifiable, building consumer trust in environmentally sustainable meat production. Initiatives include the Environmental Credentials for grass-fed beef platform pilot, which aims to create an online tool for measuring and demonstrating environmentally sustainable production practices.

Through these efforts, the Australian red meat industry is striving to meet the growing demand for sustainable food while maintaining its competitiveness in the global market.

05 THEME: Policy incentives, financing, pricing

CAP support crucial to maintain farming in areas with natural constraints, shows latest study

July 19, 2023 | European Commission | [Source](#) |

A recent study by the European Commission highlights the importance of support from the Common Agricultural Policy (CAP) in maintaining farming activities in areas with natural constraints (ANC). These areas, characterized by unfavorable conditions such as high altitudes, steep slopes, dryness, low temperatures, and poor soil quality, account for 59% of the EU's agricultural land.

The study reveals that farms in ANC areas tend to be less economically viable, with lower incomes and smaller economic sizes compared to farms in more favorable regions. Despite receiving higher subsidies per hectare, the income gap between farms in ANC and non-ANC areas remains significant, with a 20.4% income difference in mountain areas and 26.5% in non-mountain ANC regions. Without public support, many of these farms would struggle to continue their operations.

From an environmental perspective, farms in ANC areas use fewer inputs like mineral fertilizers and pesticides, reducing their environmental impact. These farms also allocate larger portions of land to beneficial land uses, such as protein crops, grassland, and fallow land, which have positive effects on soil fertility, biodiversity, and landscape preservation.

The study emphasizes the vital role of CAP income support in preventing land abandonment and maintaining food production in the EU. Allowing farms in ANC areas to cease production would likely result in reduced food production and greater intensification of already heavily managed farmland in more favorable regions.

In addition, the study highlights the ecological significance of agricultural activities in ANC areas, where the maintenance of traditional landscapes and habitats protected under the Habitat Directive is closely linked to farming practices. The cessation of agriculture in these areas would have adverse effects on ecosystems and cultural heritage.

Overall, the study underscores the need for continued support for farms in areas with natural constraints through the CAP to ensure both the economic viability of these farms and the preservation of valuable landscapes and ecosystems.

06 THEME: Policy incentives, financing, pricing

From Sky to Soil: Young Agricultural Leaders Nourish FAS Satellite Data with Grassroots Truth

August 9, 2023 | USDA | [Source](#) |

The U.S. Department of Agriculture's Foreign Agricultural Service (FAS) is collaborating with university students in Tanzania on a pilot project aimed at enhancing crop mapping and improving crop condition assessments using satellite imagery. The project involves 14 students from YouthMappers, an international network of university-based chapters dedicated to mapping activities for local and global development.

The primary objective of the FAS-YouthMappers team is to create an agricultural database of ground-truth data in the Arusha, Dodoma, and Mwanza regions of Tanzania. This data will be used to strengthen FAS satellite imagery analysis for assessing crop conditions and production estimates.

The project focuses on identifying target crops relevant to FAS' International Production Assessment Division (IPAD), which often involves distinguishing between different crops grown together in larger fields. By geo-locating these crops and collecting additional data on crop heights and pest damage, the project aims to enhance understanding of crop conditions and the impact of seasonal weather patterns.

So far, the Tanzanian YouthMappers network has collected data from 1,700 fields in the specified regions. This data will be combined with Sentinel-2 satellite imagery to improve the accuracy of crop assessments.

The collaboration also involves training additional university students in geo-mapping techniques using tools like ArcGIS, OpenStreetMap, and Kobo Collect to further support Tanzanian agriculture.

The project aligns with FAS' efforts to develop young agricultural leaders in Africa, ultimately contributing to the region's self-development and capacity building. The outcomes of this initiative will be presented at the upcoming Africa Food Systems Forum, where stakeholders aim to strengthen agricultural and food systems in Africa with a focus on inclusivity, sustainability, resiliency, and equity.

07 THEME: GHG emission reduction

Climate-smart rice production approaches for sustainable agriculture

August 14, 2023 | IRRI | [Source](#) |

The article highlights the importance of implementing climate-smart rice production technologies to address climate change, increase rice yields, ensure sustainable agriculture, and enhance long-term food security. Despite rice being a staple food for over half of the world's population, including a significant portion of India's population, rice production faces various challenges. Inadequate management practices, improper use of agricultural inputs, and the impacts of climate change are negatively affecting natural resources and global food security.

Severe climatic conditions, such as droughts, floods, and high temperatures, are causing crop failures and impacting the livelihoods of Indian farmers. Unsustainable agricultural practices, including the burning of crop residues and excessive greenhouse gas emissions, further exacerbate these challenges.

To address these issues, there is a need to transition from unsustainable agricultural practices to climate-smart and sustainable approaches. Climate-smart agriculture envisions transforming agricultural systems to support development and food security in a changing climate. Several climate-resilient and resource-efficient technologies can enhance the profitability and sustainability of rice production systems. These technologies include alternate wetting and drying, mechanized direct-seeded rice (DSR), laser land leveling, and integrated weed and crop residue management.

For example, mechanized DSR offers numerous benefits, including water savings, reduced labor, lower production costs, increased net profits, reduced drudgery, and shorter crop durations. These advantages enable early rice harvesting, timely seeding of subsequent crops like wheat, chickpea, and mustard, and contribute to sustainable agriculture.

Developing and implementing climate-smart rice production technologies not only helps combat climate change but also aligns with the UN's Sustainable Development Goals, particularly Zero Hunger and Climate Action. This approach has the potential to double farmers' income, enhance food security, and promote sustainable agricultural practices.

08 THEME: GHG emission reduction; Policy incentives, financing, pricing

Agriculture is ready to move forward with a new climate change action plan. Prepare to be published at the end of this year.

August 21, 2023 | Office of Agricultural Economics, Thailand | [Source \(in Thai\)](#) |

The Ministry of Agriculture and Cooperatives in Thailand is set to unveil a new agricultural action plan to address climate change for the period 2023-2027. This initiative follows the conclusion of the previous climate change strategy (2017-2022) and a growing awareness of the worsening climate change situation. The plan has a vision of making the Thai agricultural sector resilient to climate change based on information and an enabling environment.

The action plan focuses on five key development areas:

- **Enhancing Adaptive Capacity:** This involves supporting farmers and related sectors throughout the agricultural supply chain to better adapt to climate change, including through climate-sensitive agricultural practices and technology adoption.
- **Reducing Greenhouse Gas Emissions:** The plan aims to reduce emissions throughout the agricultural supply chain, emphasizing the production of environmentally friendly and low-carbon agricultural products.
- **Knowledge and Awareness:** Developing a knowledge database and raising awareness about climate change impacts, adaptation, and emissions reduction are key components.
- **Capacity Building:** The plan seeks to strengthen the competencies of personnel in agriculture, including knowledge transfer and training.
- **Integration and Collaboration:** This involves collaboration with various agencies both within and outside the Ministry of Agriculture and Cooperatives, as well as promoting climate change education, access to credit sources, and financial support.

The draft action plan will be presented to the Agricultural and Cooperative Development Policy and Planning Committee for consideration and approval, chaired by the Minister of Agriculture and Cooperatives. Once approved, it will be submitted to the National Climate Change Policy Committee for acknowledgment and is expected to be announced and implemented in 2023.

This action plan is significant as it marks the first time Thailand sets targets for reducing greenhouse gas emissions in support of its nationally determined contributions (NDCs) to address climate change. It aligns with the country's commitment to raising its NDCs targets from 20-25 percent to 25-30 percent by 2030, as announced during COP26.

The plan represents a crucial step toward climate-resilient and sustainable agriculture in Thailand and contributes to global efforts to combat climate change in the agricultural sector.

09 THEME: GHG emission reduction

Taitung Rural Reform Farm develops solar agricultural machinery to save energy and reduce carbon to improve farmers' efficiency

July 13, 2023 | ATRI, Taiwan | [Source \(in Chinese\)](#) |

The Taitung District Agricultural Research and Extension Station under Taiwan's Ministry of Agriculture, has developed solar-powered agricultural machinery, including unmanned seeders and four-row paper tray transplanters. These innovations align with the government's net-zero policy and significantly enhance the efficiency of farmers' work.

The new solar-powered seeders can complete the work on one hectare of land in just two hours, a vast improvement over the 30 hours required for manual labor. They also reduce seed usage to only 20% for broadcasting and 30% for row seeding, resulting in even crop growth and easier subsequent management.

These developments build on the success of the station's 2018 creation of Taiwan's first solar-powered single-passenger seeder, which received significant attention from farmers. In recent years, the station's team has continued its efforts to develop more energy-efficient and

environmentally friendly agricultural machinery, leading to the introduction of solar-powered unmanned seeders and four-row paper tray transplanters.

To address the potential issue of insufficient solar power during overcast weather, solar-powered agricultural machinery is equipped with batteries that allow farmers to plug them into electrical outlets for power when needed.

Furthermore, the compact size of these solar-powered machines allows them to be transported by small trucks weighing 3.5 tons. The solar panels have a lifespan of up to 20 years. The technology has been successfully transferred, contributing to environmentally friendly farming practices and increasing farmers' efficiency.

The Taitung District Agricultural Research and Extension Station intends to continue its research and development efforts to create different machine models for various crops in the future. These solar-powered innovations are expected to play a significant role in advancing sustainable agriculture in Taiwan while reducing the carbon footprint of farming operations.

10 THEME: GHG emission reduction

2023 Taiwan Smart Agriculture Week will debut on 8/31

August 9, 2023 | Yahoo News | [Source \(in Chinese\)](#) |

The 8th Taiwan Smart Agriculture Week 2023 is set to take place from August 31 to September 2 at the Nangang Exhibition Hall in Taipei. This event will showcase various agricultural technologies and solutions related to fresh food management, cold chain logistics, and food safety.

Given the growing concerns about food safety, freshness, and supply chain resilience due to climate change and the pandemic, there is an increased focus on upgrading cold chain management. The event aims to provide insights into innovative solutions for fresh food preservation, loss reduction, and sustainable practices.

Key highlights of the event include agricultural product pre-cooling systems, AIoT smart refrigeration chain management solutions, smart cold chain monitoring and management systems, cold storage projects and equipment, refrigeration and freezing technologies, refrigeration and freezing trucks, preservation materials and equipment, slaughtering equipment, fresh food safety testing services, and more.

As part of the event, the seminar on "Fresh Cold Chain Innovation and Sustainability" will take place on September 1. This seminar, held in collaboration with the Taiwan Cold Chain Association, will focus on fresh food cold chain innovation, service solutions, and how to integrate cold chain management for improved food preservation, reduced losses, and fulfilling low-carbon and sustainable responsibilities.

The seminar will cover topics such as cold chain intelligence, low-carbon innovation applications, temperature-controlled cold chain supply chain platforms, last-mile freshness distribution,

packaging technology for freshness assurance, and temperature control and quality assurance in cold storage panels.

The event provides an opportunity for B2B and B2C catering operators and purchasers to explore the latest technologies, purchase equipment, and engage with industry experts to enhance their fresh food cold chain management and supply chain capabilities. More information about the event and registration details can be found on the official website.

11 THEME: [Carbon sequestration](#), [ICT in agrifood sustainability](#), [Policy incentives](#), [financing](#), [pricing](#)

Minister Heydon announces awards of €1.7 million for soil, agri-digital research

August 3, 2023 | Government of Ireland | [Source](#) |

Minister of State at the Department of Agriculture, Food, and the Marine with responsibility for research and innovation, Martin Heydon, has announced funding awards totaling over €1.7 million for five research projects in the fields of soils and agri-digital research in Ireland.

The European Joint Programme on Agricultural Soil Management (EJP Soil) will receive nearly €1 million in funding for two projects. These projects, in collaboration with University College Dublin, Teagasc, and the Tyndall National Institute, will focus on developing innovative sensing technologies for monitoring and mapping soil management practices and exploring climate-smart cropping systems to enhance carbon sequestration and the cycling of nitrogen and phosphorus nutrients.

Over €0.5 million will be allocated to two projects under the European Research Network for ICT Agri-Food. These projects, involving UCD and Munster Technological University, will investigate applications of artificial intelligence in farming and the use of ICT for traceability and transparency in the food and beverage industry.

Furthermore, approximately €280,000 will support a project under the US-Ireland R&D Partnership, where Trinity College Dublin will collaborate with partners from the United States and Northern Ireland to study biochar for excess soil phosphorus sorption and slow-release mechanisms for sustainable crop production.

Minister Heydon emphasized the importance of soil research in carbon sequestration, nutrient cycling, climate change resilience, and food systems. He also highlighted the potential of agri-digitalization and artificial intelligence to enhance efficiency, sustainability, and resilience in the agricultural and food sectors.

These research initiatives aim to foster collaboration between Irish researchers and international partners to address critical challenges in agriculture, soil management, and food production.

The funding, amounting to €1,777,914, is provided through the DAFM Research Programme, supporting projects across the EJP Soil, ICT-AGRI-FOOD, and US-Ireland R&D Partnership research calls.

POLICY

01 THEME: Climate smart agriculture; Supply chain

National Agrofood Policy, 2021-2030 (NAP 2.0), Malaysia

Malaysia Ministry of Agriculture and Food Industries | [Source](#) | [Download](#) |

Introduction: The National Agrofood Policy 2021-2030 (NAP 2.0) represents a comprehensive and holistic approach to transform Malaysia's agrofood sector. Building upon the foundation laid by the first National Agrofood Policy (NAP) spanning from 2011 to 2020, NAP 2.0 is geared towards safeguarding food security while simultaneously addressing the challenges of sustainability, technology integration, and socio-economic development.

NAP 2.0 is firmly aligned with Malaysia's national development agenda, including the Shared Prosperity Vision 2030 (SPV 2030), Malaysia Five-Year Development Plan, National Fourth Industrial Revolution (4IR) Policy, and Malaysia Digital Economy Blueprint. This policy document is structured around five key policy thrusts:

- **Modernization and Smart Agriculture:** NAP 2.0 places significant emphasis on leveraging smart agricultural technologies to enhance sustainability, resilience, and technological integration across all agrofood sub-sectors.
- **Strengthening Market and Product Access:** To bolster the sector's competitiveness, the policy seeks to enhance market access and improve the value chains for agrofood products, both domestically and internationally.
- **Human Capital Development:** Ensuring a skilled and adaptable workforce is a priority, with investments in training and capacity-building to drive the sector forward.
- **Food System Sustainability:** Environmental sustainability is a core focus, with strategies to minimize waste, pollution, and resource depletion throughout the agrofood production process.
- **Creating Conducive Business Ecosystems and Governance:** NAP 2.0 aims to facilitate a business-friendly environment that encourages investment, innovation, and collaboration among public and private stakeholders.

02 THEME: Climate smart agriculture; Nature-based solution; Net Zero strategy; Supply chain

National Strategy for Climate Change until 2050, Vietnam

Vietnam Ministry of Natural Resources and Environment | [Source](#) | [Download](#) |

Introduction: Vietnam's National Strategy for Climate Change until 2050 is a far-reaching policy document that spans from 2022 to 2050, encompassing a wide range of sectors. With a clear commitment to addressing climate change, this strategy sets ambitious objectives that will drive Vietnam's resilience, emission reductions, and economic competitiveness.

Overall Objectives:

- **Effective Adaptation:** The strategy seeks to enhance Vietnam's ability to adapt to climate change effectively, reducing vulnerabilities, losses, and damage caused by climate-related impacts. This includes improving water and land resource management, fostering climate-resilient agriculture, and ensuring food security.
- **Greenhouse Gas Reduction:** Vietnam is determined to achieve net-zero greenhouse gas emissions by 2050, aligning with international efforts to protect the global climate. This goal involves significant emissions reductions by 2030 and a rapid decline in emissions following a peak in 2035.
- **Economic Growth and Competitiveness:** While mitigating climate change and enhancing resilience, the strategy aims to improve the quality of economic growth and enhance Vietnam's competitiveness.

Specific Objectives for Adaptation:

- **Water and Land Resources:** By 2030, Vietnam aims to control the deterioration of water and land resources, ensuring sufficient water supply for various sectors while minimizing vulnerability to climate impacts.
- **Agriculture:** The strategy promotes climate-resilient agriculture, sustainable value chains for agricultural products, and food security.
- **Biodiversity and Forests:** Vietnam strives to maintain at least 42% forest coverage, designate reserves, and protect coastal areas, fostering biodiversity conservation.
- **Clean Water:** The goal is to provide clean, sanitized water to 95% of the population, with 80% having access to standard clean water, enhancing public health and disaster resilience.

Specific Objectives for Greenhouse Gas Mitigation:

- **Net Zero Emission by 2050:** Vietnam commits to achieving net-zero greenhouse gas emissions by 2050, with emissions peaking in 2035 and then rapidly declining.

Sectoral Mitigation: The strategy outlines sector-specific objectives, including adopting low-emission agricultural practices, promoting sustainable forestry and land use, and reducing waste throughout production and consumption.

03 THEME: Climate smart agriculture; Nature-based solution

UK 25 Year Environmental Improvement Plan

UK Department for Environment, Food & Rural Affairs | [Source](#) | [Download](#) |

Introduction: The 25 Year Environment Plan of 2018 outlines the UK government's commitment to restoring and maintaining the health of the natural world. It prioritizes initiatives to improve air and water quality, protect endangered species, and enhance biodiversity. The plan advocates for an environmentally conscious approach to agriculture, forestry, land use, and fishing.

Key Objectives

- Achieving cleaner air and water, thriving wildlife habitats, and reduced environmental hazards.
- Implementing sustainable practices to manage natural resources more efficiently.
- Promoting social justice by addressing pollution disparities and enhancing access to nature's benefits.
- Mitigating and adapting to climate change to safeguard against its adverse effects.
- Enhancing biosecurity measures to protect against environmental threats.

Policy Focus Areas

- Sustainable land management, including environmental net gain principles and soil health improvement.
- Nature conservation efforts, such as establishing a Nature Recovery Network and conserving natural beauty.
- Connecting people with the environment to improve health and well-being.
- Resource efficiency and pollution reduction strategies, including zero avoidable plastic waste and clean air initiatives.
- Sustainable management of seas and oceans, balancing environmental conservation with thriving marine industries.
- International leadership in environmental protection and support for developing nations' environmental initiatives.

Implementation Strategies

- Establishment of an independent body and environmental principles to uphold accountability.
- Development of metrics to monitor progress towards 25-year goals.
- Regular plan refreshment to align with evolving priorities and evidence.
- Strengthening local planning, partnerships, and leadership for effective delivery.
- Collaboration with stakeholders to identify their contributions to plan goals.
- Exploration of mechanisms like a green business council and a natural environment impact fund to support plan objectives.

04 THEME: Climate smart agriculture; Conservation; Net zero strategy; Supply chain

UK Environmental Improvement Plan 2023

UK Department for Environment, Food & Rural Affairs | [Source](#) | [Download](#) |

Introduction: The 25 Year Environment Plan (25YEP) review outlines our continued commitment to environmental sustainability. With a focus on thriving ecosystems, clean air and water, and climate resilience, this policy brief highlights key strategies for achieving our environmental goals.

Key Initiatives

- **Nature Restoration:** Investing in habitat creation, tree planting, and marine protection to halt biodiversity decline. We prioritize initiatives like the Species Survival Fund and Nature Recovery Network to enhance natural habitats.
- **Environmental Quality:** Addressing air and water pollution through emissions reduction, wastewater treatment upgrades, and sustainable farming practices. A new Chemicals Strategy and Integrated Pest Management support sustainable chemical and pesticide use.
- **Resource Efficiency:** Transitioning to a circular economy by implementing extended producer responsibility, deposit return schemes, and sustainable resource management practices.
- **Climate Action:** Mitigating and adapting to climate change through net-zero emissions targets, land use planning, climate resilience strategies, and global leadership in climate action.

Biosecurity Enhancement: Implementing biosecurity measures to protect biodiversity from invasive species threats, including action plans and tailored import controls.

05 THEME: Supply chain; Sustainable consumption; Nature-based solution

Organic Agriculture Action Plan 2023-2027 (Thailand)

Thailand Office of Agricultural Economics | [Source](#) | [Download](#) |

Introduction: The Ministry of Agriculture and Cooperatives in Thailand is acutely aware of the imperative to address food security challenges within urban areas. This urgency has been amplified by a significant demographic shift that occurred in 2019 when urban populations exceeded rural populations for the first time in the country's history. This trend underscores the ongoing process of urbanization within Thailand, where a striking statistic reveals that less than 10% of the population has the means to cultivate their own sustenance. Faced with this stark reality, the Ministry of Agriculture and Cooperatives has proactively embarked on a mission to promote urban agriculture and cater to the needs of the modern era.

A key component of this strategy is the enthusiastic endorsement of organic agriculture. The overarching vision revolves around the expansion of organic farming practices. Between 2017 and 2021, a total of 342 initiatives were launched to drive the growth of organic farming. The overarching objectives include expanding organic farming areas by at least 1.3 million rai (equivalent to approximately 208,000 hectares) and engaging a minimum of 80,000 farmers in organic cultivation endeavors. Over this period, the value of organic agricultural produce exhibited an average annual growth rate of 3 percent.

Building upon this achievement, the strategic roadmap for organic agriculture spanning 2023 to 2027 has been unveiled. The new plan sets ambitious targets, aiming to increase organic agriculture areas to 2.0 million rai (approximately 320,000 hectares) and expand Good Agricultural Practices (GAP)-certified agriculture areas to 2.5 million rai (approximately 400,000 hectares) by the plan's conclusion. The plan encompasses critical development facets, including promoting research, technological innovation, and the creation of an organic agriculture database. It also focuses on enhancing production capacity and management across the organic agriculture supply chain, elevating standards and certification systems, and fostering greater awareness and marketing efforts to promote organic agriculture practices. This comprehensive strategy reflects Thailand's commitment to addressing food security challenges, nurturing sustainable agriculture, and ensuring a resilient future for its urban population.

06 THEME: Climate smart agriculture; Supply chain

The 13th National Economic and Social Development Plan, 2023-2027 (Thailand)

Thailand Office of the National Economic and Social Development Council | [Source](#) | [Download](#) |

Introduction: The 13th National Economic and Social Development Plan (2023-2027) serves as a pivotal level 2 strategy, essential for translating the national strategy into tangible actions. This framework operates as a blueprint for formulating level 3 plans, thereby facilitating collaborative efforts among developmental partners to align with overarching national strategic objectives. Governed by the National Economic and Social Development Council Act of 2018, the preceding 12th National Economic and Social Development Plan remained effective until September 30, 2022. This transitioned into a new 5-year phase, with the commencement of the 13th National Strategy on October 1, 2022, encompassing the fiscal years 2023-2027. This second 5-year period underpins the continued evolution of the National Strategy, with a focus on the agricultural sector's transformation towards high-value agricultural output and processed products. This transformation is predicated on the integration of technology to enhance productivity, diminish reliance on finite natural resources, and enhance the value of agricultural goods for the burgeoning high-value food industry.

The strategies aligned with this vision are as follows:

- Expanding eco-friendly and high value-added sustainable farming models based on domestic success cases, such as farming related Bio-Circular-Green (BCG) economy, good agricultural practice, agroforestry, organic farming, agritourism, artisanal fishery, legal fishing, and good labor practice. (Climate Smart)
 - Improving the efficiency of farm management and post-harvest activities to reduce costs and increase the value of agricultural produce. (Digit Smart)
 - Developing an agricultural database and data repository system and encouraging the effective use of data (Digit Smart)
 - Enhancing the capacities of farmers and agricultural institutions (Digit Smart)
-

OPEN DATA

01 THEME: Climate smart and Net zero toolkit

Tania - Open Source Farm Management Software

Tania | [Source](#) |

Tania is a farmer's journal that operates on an open-source framework, built using Go, Vue.JS, and SQLite technologies. This innovative journaling system originated in November 2016 due to the unavailability of appropriate software that could cater to the unique requirements of connecting diverse sensors and automators for home backyard gardens. Tania's primary purpose is to facilitate the management of these gardens, even while users are on the move.

Designed with farmers, growers, and researchers in mind, Tania offers an efficient solution for managing farms. It is particularly advantageous for individuals who need to oversee various aspects of their agricultural endeavors, such as monitoring sensors and automated systems, all while being able to access and manage the information remotely.

Despite its initial modest scope, Tania is continuously evolving. The developer behind the project welcomes collaborations from interested parties who share the vision of expanding and enhancing the application. This presents a valuable opportunity for like-minded individuals to contribute their expertise and collectively elevate Tania into a more comprehensive and impactful platform for agricultural management.

02 THEME: Climate smart and Net zero toolkit

LiteFarm

LiteFarm | [Source](#) |

"LiteFarm" serves as a no-cost, open-source solution tailored to the needs of both existing and aspiring sustainable farms. Developed through a collaborative effort involving farmers and researchers coordinated by the University of British Columbia, this innovative tool was conceived to tackle the diverse challenges inherent in effective farm management.

With a mission to support sustainable farming practices, LiteFarm stands as a testament to the convergence of agricultural expertise and technological innovation. Notably, it has garnered a presence in over 140 countries, where it actively facilitates the orchestration of farm operations. This widespread adoption underscores its practicality and effectiveness on a global scale.

What sets LiteFarm apart is its inclusive co-design process, involving farmers directly. This approach underscores a commitment to user-friendliness, with a primary focus on ensuring that the tool is intuitive and accessible. Its array of features is meticulously tailored to cater specifically to the distinctive requirements of sustainable, diversified, and organic farming practices.

03 THEME: Climate smart and Net zero toolkit

Farmery

Hackster | [Source](#) |

Farmery, born in November 2020, is an open-source smart farm management system powered by NodeJS, Vue.JS, and MongoDB. Its genesis arose from a global mission to equip farmers worldwide with technology, bridging the gap between traditional farming and modern innovation. This visionary project integrates an array of sensors, smart devices, task management, and automation processes to revolutionize farming practices, allowing for efficient and remote management.

Whether you're a seasoned farm owner, a curious scientist, a dedicated grower, or a forward-thinking researcher, Farmery offers a versatile solution to streamline your agricultural endeavors. While it may be a small project in its current form, Farmery welcomes collaboration and expansion, eagerly seeking partners to amplify its impact.

Farmery represents a transformative journey, marked by innovation and user-friendly tools designed to simplify every facet of cultivation. With Farmery at your disposal, you gain the power to remotely oversee tasks, harness real-time sensor data, and effortlessly orchestrate automation, all within a single platform. Welcome to the future of farming – welcome to Farmery.

04 THEME: Climate smart and Net zero toolkit

Roboflow Universe

Roboflow | [Source](#) |

Founded in January 2020, Roboflow is on a mission to simplify computer vision for developers. They streamline data labeling and model training, making machine learning accessible to all. Recognizing the challenges, they faced when building their own applications, they created a user-friendly platform. Backed by top investors, including Craft Ventures and Y Combinator, Roboflow aims to remove barriers to success in computer vision. With a track record of award-winning projects, Roboflow's team understands the complexities of machine learning. Their goal is to provide efficient solutions for taking ML projects to production.

Top Agriculture Datasets: The use-cases for computer vision in agriculture are endless. From weed detection, to crop disease treatment, to automated spraying via drones, to autonomous tractors, to color sorting, to livestock monitoring, these datasets and pre-trained models can be used to optimize farmers' productivity, and boost yield, decrease costs, and increase profits. In addition to these curated agriculture datasets, thousands more datasets are available for free on Roboflow Universe.
