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SUSTAINABLE
DEVELOPMENT
GOALS

Nature-based solutions in managed ecosystems (agriculture, forestry, fisheries)

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Nature-based Solutions (NbS)



“Nature-based solutions are actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits”

UNEA, March 2022



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Nature-based Solutions (NbS)

NbS use to managed ecosystems (agriculture, forestry, fisheries).



Agroecology, agroforestry, climate-smart agriculture, ecosystem-based adaptation, ecosystem-based disaster risk reduction, forest and landscape restoration, integrated water resource management, integrated pest management, land-based mitigation options, sustainable land management, etc.



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Nature-based Solutions (NbS)

NbS in managed ecosystems can be grouped in three main categories, according to their main objective (as identified in the UNEA definition):

- i. Actions to protect and conserve managed ecosystems and their ecosystem functions (e.g. protected areas);
- ii. Sustainable management practices - primarily for production purpose (e.g. agroecology, agroforestry, organic agriculture, integrated pest management);
- iii. Actions to restore (or re-create) managed ecosystems and their ecosystem functions - including amelioration and green infrastructure (e.g. tree planting, conservation agriculture, constructed wetlands).



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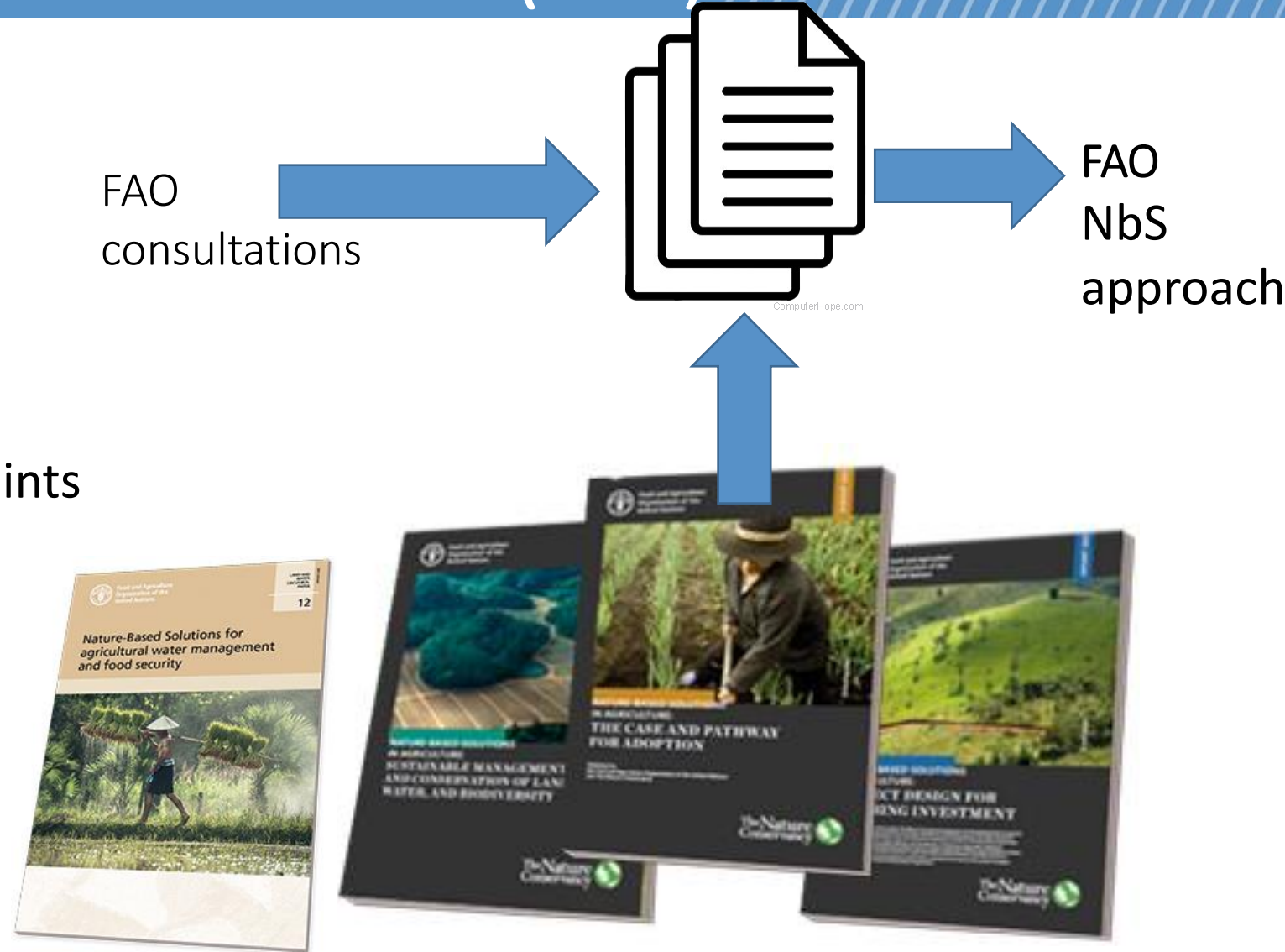
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Nature-based Solutions (NbS)

FAO NbS “framework”

- FAO’s approach to NbS in managed ecosystems (agriculture, forestry, fisheries).

Through establish FAO NbS focal points
from divisions and decentralized
offices





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LOA

- Land and Water Division
- Policy and finance analysis for NbS use in managed systems



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Nature-based Solutions (NbS)

NbS case studies

- Vietnam baseline (RAP)
- Columbia and Chile, dry corridor (REDD++)(RLC)
- SIDS whole island approach (SLC)
- Land and water (NSL)
- NbS approach for carbon markets (CFI)
- Urban and per-urban settings (UN Decade)
- Resilience and DRR (OER)

Modular system

- Biodiversity
- Water regulation
- CCA and CCM
- Energy
- Etc.





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Nature-based Solutions (NbS)

FAO Country Support Packages + Training

- Overview of NbS and how it relates to FAO's mandate
- Technical linkages to existing tools and concepts (forest, ag, fisheries)
- Global scope of NbS
- Funding opportunities (GEF8, GCF, adaptation funds)
- Case studies + other resources





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Nature-based Solutions (NbS)

Partnerships



- Joint document and side events UNFCCC and CBC

Possible next areas:

- Tools and modules
- Country joint actions
- Joint proposals and country approaches
- Advocacy in global settings

Initial discussions





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Nature-based Solutions (NbS)

UNEA resolution co-sponsors

-  Costa Rica
-  Colombia
-  Montenegro
-  Pakistan
-  Peru
-  Principality of Monaco
-  Republic of North Macedonia
-  Serbia
-  United Kingdom

Countries to assess

-  Ireland
-  Zambia
-  Bangladesh
- Etc.



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Additional 2023 future areas:

- On line portal for research and operations, with contributions of professionals, research and youth.
- Linkage to the UN Decade
- Tools and methodology



UNITED NATIONS DECADE ON
**ECOSYSTEM
RESTORATION**
2021-2030



In practice: NBS in agricultural landscapes

- Assumes that major agricultural production systems lead to ecosystem degradation over time
- NBS target improvements in different ecosystem functions
- NBS are usually multifunctional
- Possible to design structured combination of NBS
- NbS is a multi-disciplinary approach focused on local needs and perspectives



'Framework' for conceptualizing NBS options in agriculture landscapes

Sustainable management practices - primarily for production purpose

Sustainable practices

- Sustain or increase agricultural production by means other than standard approaches
- Retain or increase available nutrients in soil, water and plants
- Improve microclimate

Actions to restore (or re-create) managed ecosystems and their ecosystem functions

Green Infrastructure

- Regulate water flows
- Prevent soil erosion (soil quality)
- Stabilise slopes

Amelioration

- Remove, degrade or contain pollutants in water, soil or air
- Restore or stimulate beneficial biota for soil health, pollination or pest control
- Sequestration of carbon

Protect and conserve managed ecosystems and their ecosystem functions (e.g. protected areas)

Conservation

- Increase or protect biological diversity and habitat (field scale)
- Enhance connectivity and health of ecosystems (large scale)



Experience to date

- Regional engagement with policy makers
- NBS planning approach developed and applied in the development of GEF-7 and Adaptation Fund projects:
 - Cambodia
 - India
 - Myanmar
 - Vietnam

STEP 1 - Baseline situation

- Existing condition and practices and likely future trends

STEP 2 - Problems, their causes, magnitudes and impact

- Problem quantification and severity
- Location and scale
- Causes – agricultural/other
- Timeframe and impact: agriculture and social

STEP 3 – Wider enabling environment for NBS

- Current constraints and enabling conditions

STEP 4 - NBS solutions that are likely to resolve specific problems

- Review of current solution proposed in project
- Possible additional solutions
- Scale, impact and resilience



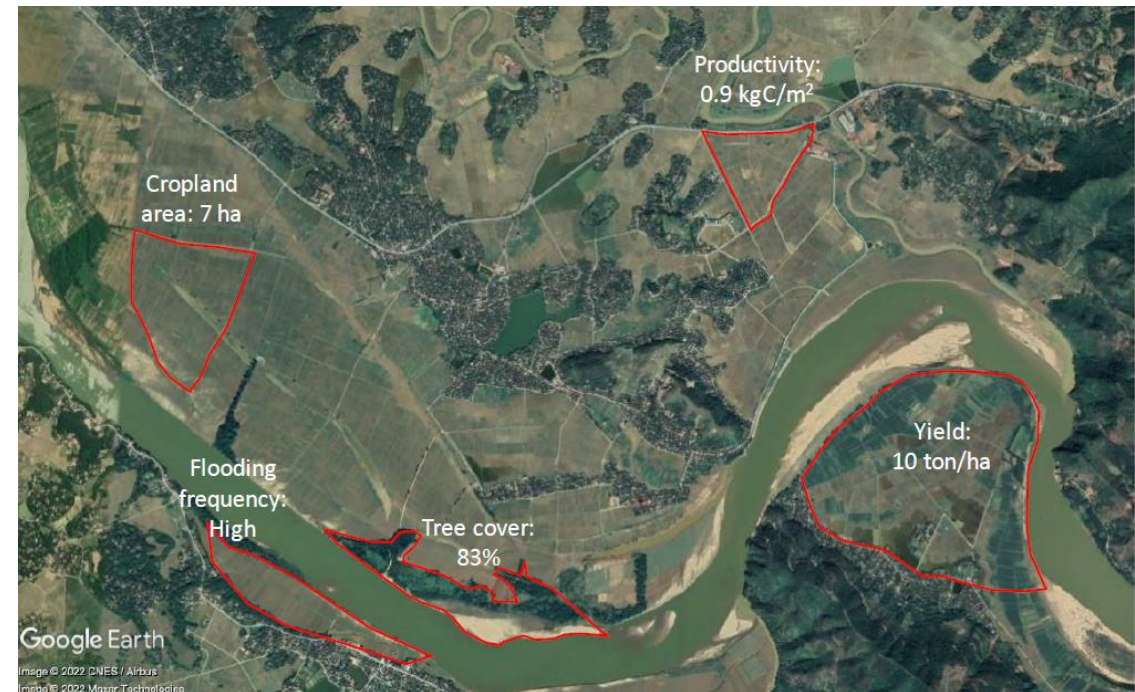
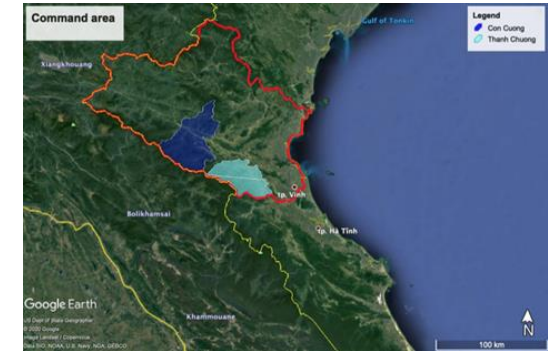
Considerations for practical application of NBS

- Application of NBS requires **additional consideration of scale and time**; particularly how to best spatially and temporally:
 - select and sequence what and how to intervene to generate positive biophysical interactions and social benefits in and between agroecosystems, and
 - sustainably expand connectivity of positive interactions.
- NBS is **an inclusive and people-centered approach** that aims to enhance ecosystem functions for the benefit of people and the environment.
- In practice, NBS will often **build upon and combine a range of existing concepts, measures, practices and**



NBS work at FAO Asia-Pacific

- Development of practical tools to support design and monitoring of NBS:
 1. Process for ex-ante multi-criteria assessment of NBS options.
 2. Inclusive, multi-disciplinary NBS planning approach for agriculture at local and national levels.
 3. NBS knowledge management and monitoring system that links NBS interventions to SDGs.
 4. Geospatial tools for NBS planning and monitoring.
- Partnership with ICRAF, AIT and FAO Geospatial Team.





Defining initial indicators and geospatial tools to support PRA and Monitoring

NBS criterion	Name of indicators	Unit	Description	Assessment tool
Sustainable Practice				
<i>Sustain production</i>	Agricultural production	ton	For each main crop in the study site: production per land area	Any GIS software
<i>Sustain production, maintain/improve soil fertility</i>	Degraded land areas	ha	Based on land use changes overtime, lands are classified into degraded, improved, or no change. The indicator refers to degraded areas	SEPAL (SDG 15.3.1 module)
Green Infrastructure				
<i>Regulate water flow, reduce soil erosion, enhance slope stability</i>	Surface run-off relative to precipitation	%		InVEST
	Average annual soil loss	tons ha ⁻¹ year ⁻¹		SEPAL (SDG 15.3.1 module)
	Cropland areas exposed to flood	ha	Based on flood frequency maps (low, moderate, high flood frequency level) obtained from historical flood record and analysis	UNSPIDER Recommended Practice in Google Earth Engine



Mapping product samples



Source: United Nations. 2020. Map of the world [online]. [Cited July 2022]

Land cover for Thanh Chuong district of Vietnam was prepared for 2021 to assess the performance of Nature based Solutions (Nbs) indicators in Vietnam. The National Land Cover (LC) legends were derived and modified from the Department of Agriculture and Rural Development (DARD) dated 2019. Sentinel 1, 2 and Planet imageries were used for classification to obtain LC at 5m spatial resolution.

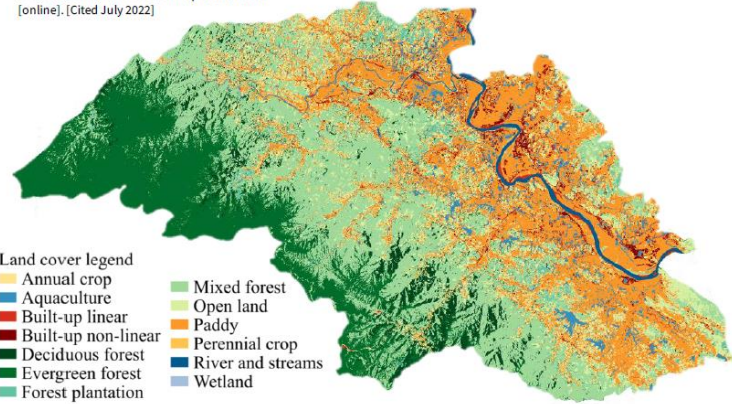


Figure: Land cover map (5m x 5m) for 2021 in Thanh Chuong district of Vietnam derived and modified from national LC legends (2019 DARD LULC)



Source: United Nations. 2020. Map of the world [online]. [Cited July 2022]

To measure the land degradation (SDG 15.3.1) in Thanh Chuong district of Vietnam, soil organic carbon (input data to SDG 15.3.1) at 0-30 cm depth was derived from Soilgrid. The data were obtained at 250 m spatial resolution and aggregated into townlets for comparative assessment.

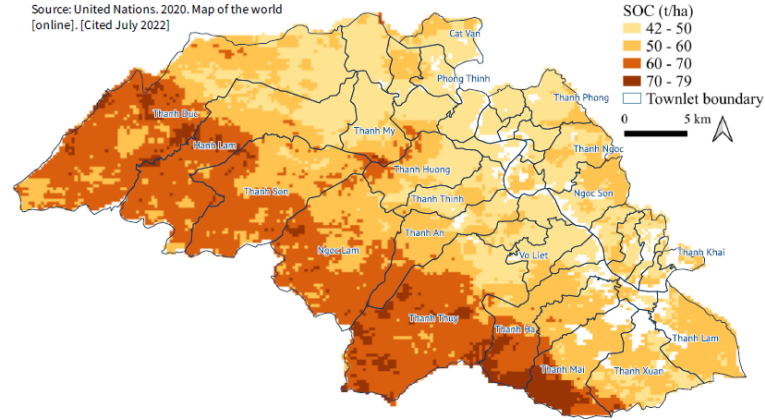
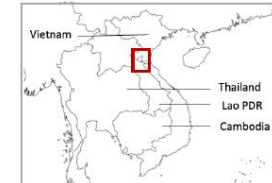


Figure: Spatial extent of Soil Organic Carbon (SOC) at 0-30 cm depth (250m x 250m grid) in Thanh Chuong, Vietnam



Source: United Nations. 2020. Map of the world [online]. [Cited July 2022]

Flooding frequency in Thanh Chuong district of Vietnam was calculated for the period 2017-2021 to assess the impact on cropland and agricultural production. The flood extent was created using a change detection approach on Sentinel-1 (SAR) data. The results were obtained at 10m spatial resolution.

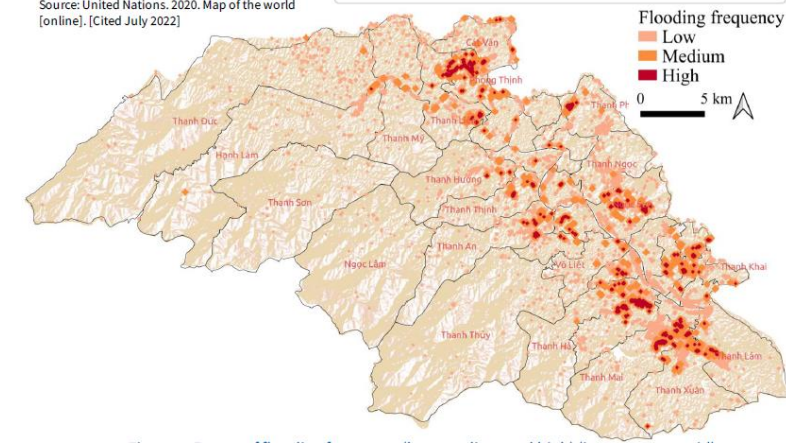
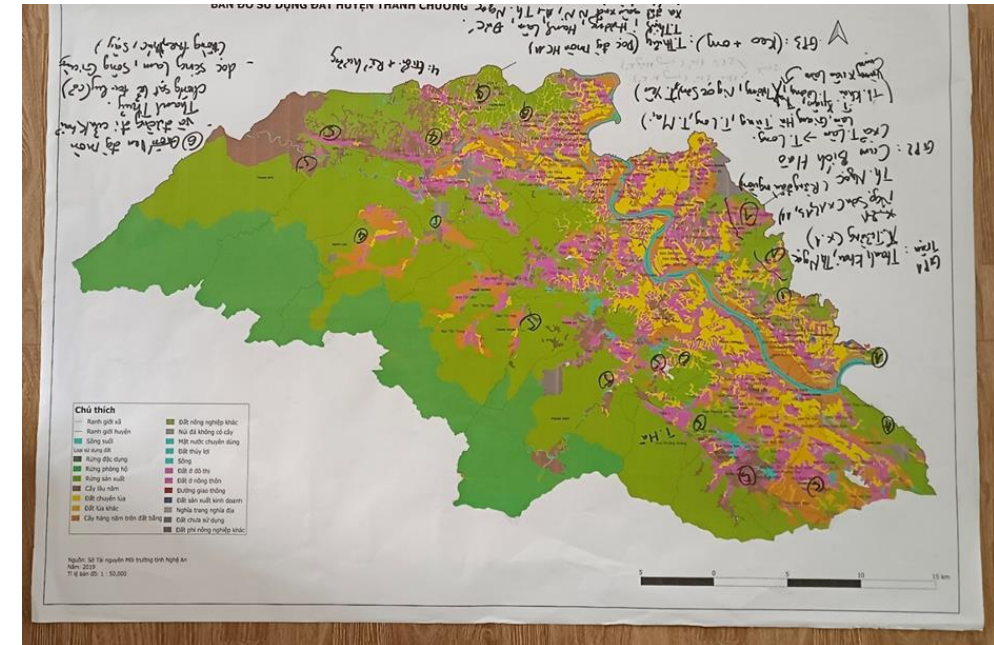


Figure: Extent of flooding frequency (low, medium and high) (in 10m x 10m grid) in Thanh Chuong, Vietnam for the period 2017-2021



PRA Example - Potential NBS in Thanh Lam commune, Vietnam

- Results of participatory identification of NBS options:
 - NbS 1 AF with timber trees for selective logging and medicinal plants over the hills
 - NbS 2 Rice-fish rotation in the lowland paddy rice areas)
 - NbS 3 Long-rotation acacia with honey bee
 - NbS 4 AF contour planting on sloping lands with timber or fruit trees, annual crops, and/or medicinal plants
 - NbS 5 Tea AF with perennial shading trees, timber or fruit trees, and/or temporary annual crops in the first two years



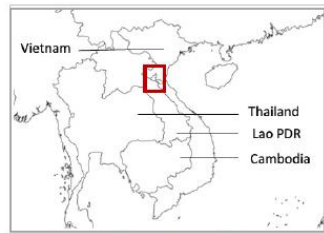


Initial lessons from PRA and MCA weighting exercise

- Increasing income is the most important concern for local communities
- Communities hesitant to disrupt income generating activities – for example, people hesitant to intercrop trees into hills with trện because they are already generating income
- Labor is available and is not a crucial factor
- Communities prefer fewer products to allow for a focus on management
- Soil erosion and soil fertility are a key concern
- Feedback received differs with administrative unit



Further targeting NBS



Source: UN. 2020. Map of the world [online]. [Cited July 2022]

Rice is one of the major crops grown in Vietnam. The extent of rice field was obtained by training a machine learning model to classify the satellite imageries (Planet, Sentinel 1 and Sentinel 2) for 2021. The results were obtained at 5-meter spatial resolution and aggregated into townlets for comparative assessments.

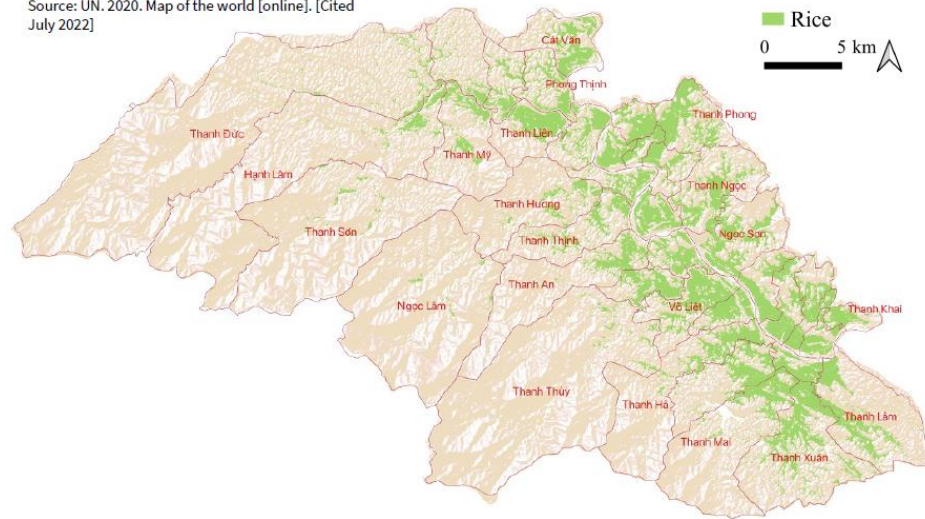
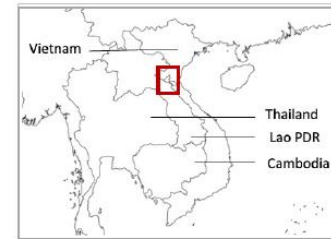


Figure: Spatial extent of rice field for 2021 in Thanh Chuong, Vietnam



Source: UN. 2020. Map of the world [online]. [Cited July 2022]

The rice-fish culture was identified as one of the Nature-Based Solutions interventions in Thanh Chuong, Vietnam. The suitability area for rice-fish culture is obtained by overlaying the wet rice field and slope. The results were obtained at 5-meter spatial resolution and aggregated into townlets for comparative assessments.

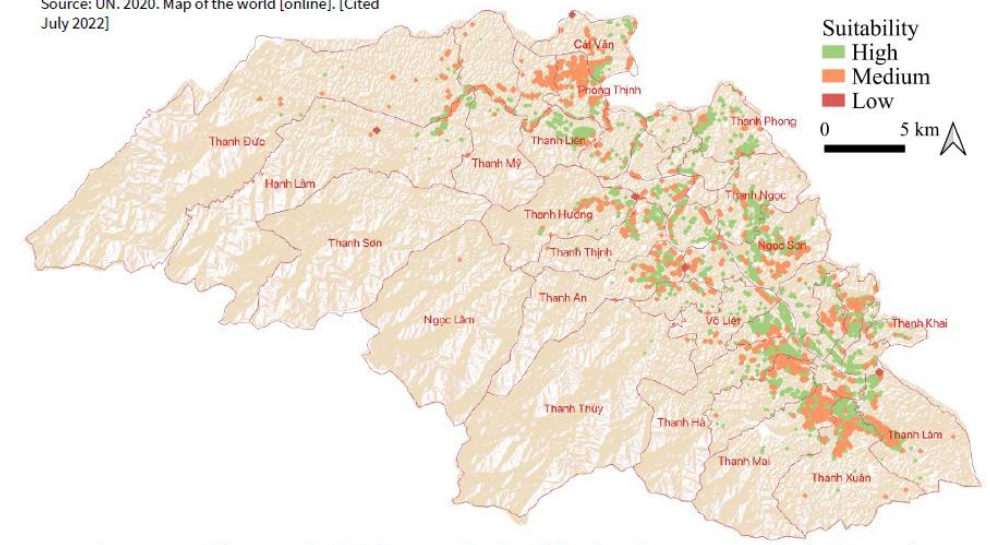


Figure: Spatial extent of suitability areas for rice-fish culture in Con Cuong district for 2021



Knowledge management systems for linking NBS initiatives to SDGs

Food and Agriculture Organization of the United Nations | Global Frameworks | SDGs and Frameworks Nexus

Sustainability Development Goals (SDGs)
(Click on one of the SDGs to view mapped frameworks)

- 1 NO POVERTY
- 2 ZERO HUNGER
- 3 GOOD HEALTH AND WELL-BEING
- 4 QUALITY EDUCATION
- 5 GENDER EQUALITY
- 6 CLEAN WATER AND SANITATION
- 7 AFFORDABLE AND CLEAN ENERGY
- 8 DECENT WORK AND ECONOMIC GROWTH
- 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
- 10 REDUCED INEQUALITY
- 11 SUSTAINABLE CITIES AND COMMUNITIES
- 12 RESPONSIBLE CONSUMPTION AND PRODUCTION
- 13 CLIMATE ACTION
- 14 LIFE BELOW WATER

FAO-NB Dimensions Sub-dimensions Indicators Sub-indicators

(Click on the data points to view associated SDGs)

Nature-Based Solutions Monitoring Framework (FAO-NB)

FAO-NB Sub-dimension
4 Conservation [Must have a species preservation benefit]
4.2 Enhance connectivity, area or health of ecosystems (large scale)

Associated SDG Targets/Indicators

SDG 14
Conserve and sustainably use the oceans, seas and marine resources for sustainable development (FOLUR | Aichi | FAO-AB | TAAS | LDCF | AWS | Organic | RIMA-II)

Target 14.2
By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans (FOLUR | Aichi | TAAS | LDCF)

Indicator 14.2.1
Proportion of national exclusive economic zones managed using ecosystem-based approaches (Aichi | TAAS | LDCF)

SDG 15
Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss (FOLUR | FAO-AB | Aichi | TAAS | Organic | TAPE | SRP | RIMA-III)



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Next Steps

- Finalize assessment in Nghe An
- Finalize geospatial tool
- Assess options for platform integration with FAO HIHI and se.plan
- Finalize PRA and MCA reports
- Finalize online KMS platform
- Final submission of Vietnam Adaptation Fund project
- Development of NBS pipeline projects