

The Global Goal on Earth Observation: Using Earth Observation to Support Climate Adaptation

Amy Campbell
Junior Professional in AI for Climate Science

Sarah Connors
Climate Applications Scientist, ESA

04/05/2026

Policy Context: The UNFCCC's Global Goal on Adaptation

Article 7 of the Paris Agreement covers Adaptation: *“enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change”*.

The GGA comprises 11 Targets and 59 Adaptation Indicators.

4 dimensional / policy cycle Targets:

- Impact, vulnerability and risk assessment (10a)
- Planning (10b)
- Implementation (10c)
- Monitoring, evaluation and learning (10d)

7 theme / sectoral Targets:

- Water (9a)
- Food & Agriculture (9b)
- Health (9c)
- Ecosystems and Biodiversity (9d)
- Infrastructure and Human Settlements (9e)
- Poverty eradication (9f)
- Cultural heritage (9g)

Examples of the GGA Indicators: Water

Water Security & Resilience

Some indicators can be directly or indirectly monitored by EO

A mapping of GGA indicators is ongoing by the EC-JRC

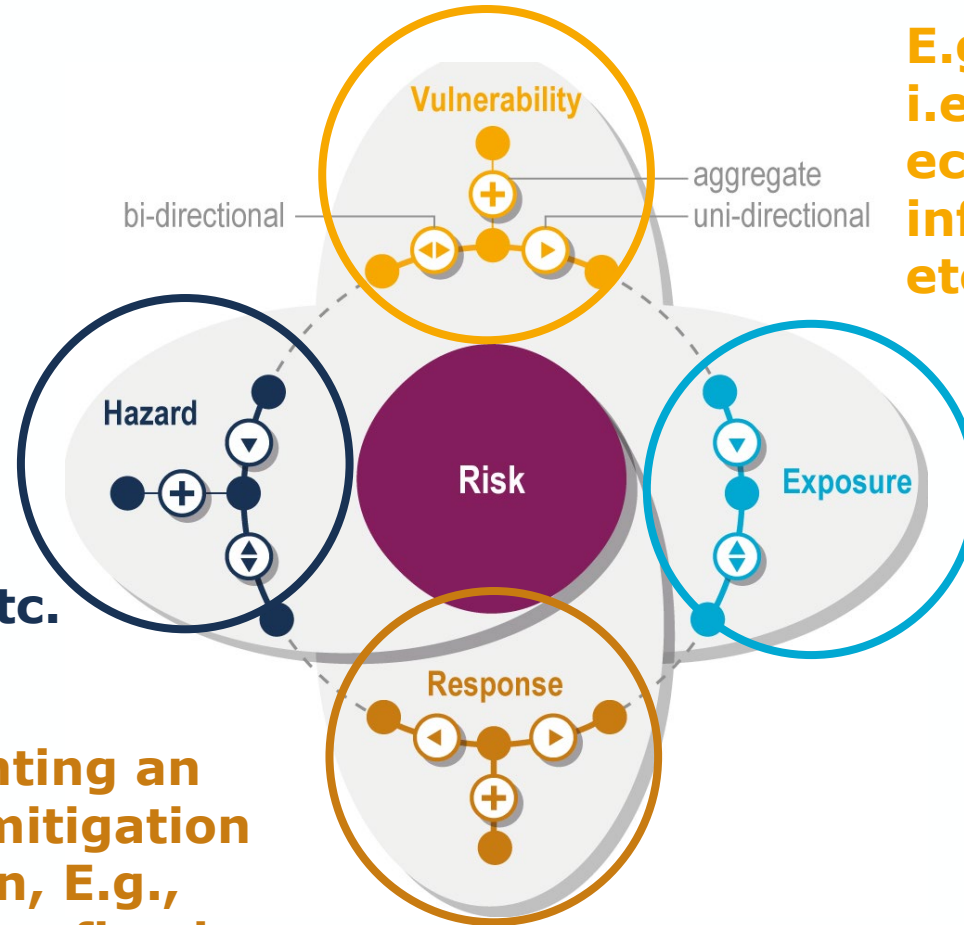
Indicator ID	Indicator Name	EO Support	Possible EO Data
9a01	Water stress levels including as an outcome of adaptation actions where applicable, accounting for relevant climate hazard intensity and/or frequency	INDIRECT	ERA5, GRACE, WaPOR
9a02	Level of water use efficiency, including as an outcome of adaptation actions where applicable	INDIRECT	Sentinel-2, WaPOR
9a05	Proportion of the population using safe and affordable potable water services that are climate-resilient, including as an outcome of adaptation actions where applicable	INDIRECT	Sentinel-1 SAR, CEMS GFM
9a06	Proportion of the population using sanitation services that are safely managed and climate-resilient, including as an outcome of adaptation actions where applicable	INDIRECT	Sentinel-1 InSAR
9a08	Proportion of bodies of water with good ambient water quality for drinking water supply, including as an outcome of adaptation actions where applicable	DIRECT	Sentinel-2, CLMS LWQ
9a09	Number of people per 100,000 supported in planned relocation processes in response to water-related hazards, where adaptation measures were taken to ensure safety of populations	INDIRECT	Sentinel-1 SAR, CEMS Rapid

Climate Adaptation: At the centre is Risk – What can EO bring?

Risk Definition: the process of adjustment to actual or expected climate changes and its effects, to moderate harm or exploit beneficial opportunities.

E.g., extreme temperature, storm surges, drought, sea level rise, diseases, etc.

After implementing an adaptation or mitigation response option, E.g., land-use change, flood defences etc.



E.g., demographics i.e., age, gender, economic conditions, infrastructure state etc.

E.g., location / topography i.e. coastal, low/lying, valley, etc.

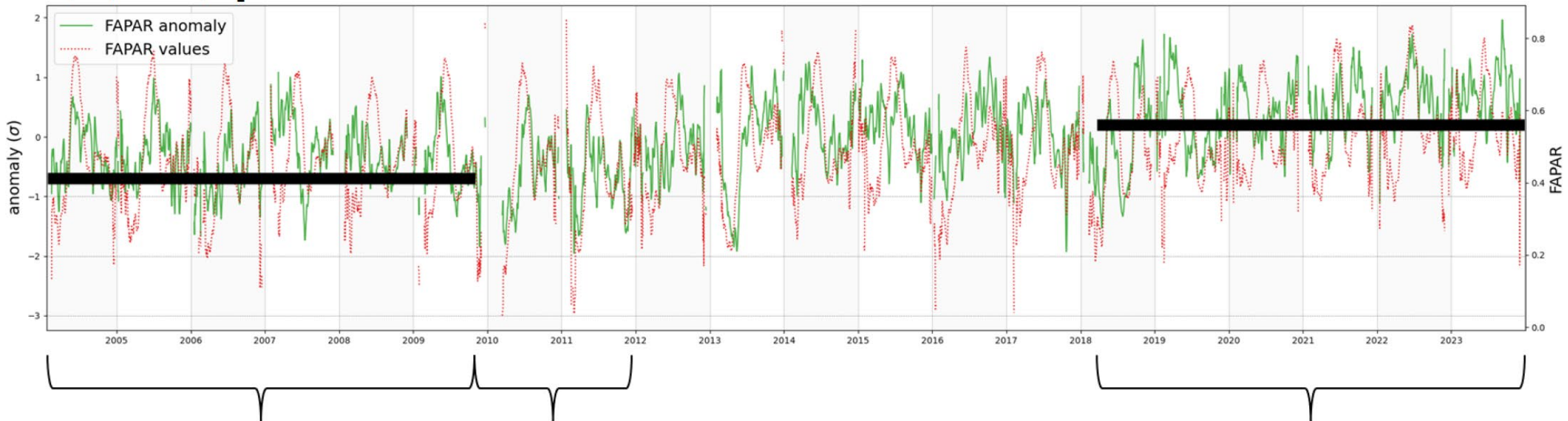
IPCC (2022) Chapter 1 Figure 1.5

EO for Adaptation more broadly

Relevant GGA Target	EO quantity	Example adaptation application(s)
Biodiversity, Food & Agriculture	FAPAR	Crop yield estimation, Drought monitoring, Vegetation photosynthetic capacity
	Leaf Area Index (LAI)	Crop yield estimation, Biomass amount
	Normalised Difference Vegetation Index (NDVI)	Vegetation presence and relative density, agricultural practice changes, nature-based solutions
	Burned Area / Active Fires	Wildfires
	Surface Soil Moisture	Drought monitoring
Health	Surface Radiation, Turbulent Heat Fluxes	Assessment of excessive heat storage and human heat exposure
	Mole Fraction / Tropospheric Column	Air quality monitoring (ozone, NOx, formaldehyde)
	Aerosol Optical Depth (AOD)	Air quality monitoring (particulate matter, combustion)
	Land Surface Temperature (LST)	Assessment of heat exposure
	Earth surface albedo	Radiation exposure, urban greening
Biodiversity, Health	Ocean Colour	coral bleaching / marine protection, species migration, water quality monitoring
Water	River Discharge	Flooding
	Terrestrial Water Storage Anomaly	Flooding, drought monitoring, aquifer over abstraction
Infrastructure	Ground subsidence	Coastal flood risk monitoring
All GGA themes	Land Cover	Multiple uses for mapping changes in area over time

Monitoring Adaptation effectiveness?

Example below shown for Nature-Based Solutions (NBS). How to attribute changes? Work ongoing by the ESA Climate Section...



Periode before NBS implementation where baseline condition are established

NBS establishment

Periode well after implementation of NBS where effects can best possible be measured

Tracking Land Cover Change and Fires



Thank you for your attention

And thank you, Amy, for stepping in last minute!

Email: Sarah.Connors@esa.int

LinkedIn: <https://www.linkedin.com/in/sarah-l-connors/>

Further Reading:

IPCC Report – <https://www.ipcc.ch/report/ar6/wg2/>

UNFCCC GGA - <https://unfccc.int/topics/adaptation-and-resilience/workstreams/gga>

ESA's CLIMATE CHANGE INITIATIVE

GCOS defined **55** Essential Climate Variables | **36** benefit from space observations | **27** generated by ESA Climate Change Initiative

